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# Developing, Promoting, & Sustaining the Undergraduate Research Experience in Psychology

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# Foreword


## Stephen F. Davis

***Texas Wesleyan University***


Over forty years ago when I was a student…. Yes, I realize that this piece is starting out like a "back in the good old days" vignette. However, I ask you to bear with me. Perhaps I can put a little twist on the typical good old days theme.

In any event, during my days as a student, collaboration between students, especially undergraduates, and faculty was virtually unheard of and very few students, except advanced graduate students, were allowed or encouraged to attend professional society meetings. Likewise, being an author on a published journal article was uncommon for graduate students and definitely not an option for undergraduates. Thankfully, these "good old days" are a thing of the past; in the first decade of the 21st Century things are vastly different!

Since the 1970s the awareness of and interest in the teaching of psychology at all academic levels has grown steadily. Several seminal occurrences highlight this development. In 1974 the first issue of the journal *Teaching of Psychology* appeared (see, Daniel, 1992). Second, the late 1970s,1980s, and early 1990s witnessed the development of the National Institute on the Teaching of Psychology (founded in 1978) and several regional teaching conferences (such as the Mid-America Conferences for Teachers of Psychology, 1984; the Southeast Conference on the Teaching of Psychology, 1989; and the Southwest Conference for Teachers of Psychology, 1991; see Davis & Smith, 1992). Third, and more germane to the main focus of this new e-book, the 1970s and 1980s witnessed the development and proliferation of regional student conferences (see, Carsrud, 1975; Davis & Smith, 1992). Also germane to this new book was the founding of the Council for Undergraduate Research in 1978 by several chemists from private colleges. This association which now has nearly 500 member institutions believes that undergraduate research can make a significant contribution to the knowledge base. Finally, the Society for the Teaching of Psychology (in conjunction with such entities as the National Institute on the Teaching of Psychology and the Center for Excellence in Teaching and Learning at Kennesaw State University) has initiated a series of "Best Practices" conferences. Again, relevant to the focus of this book, it is noteworthy that the 2004 conference was on "Best Practices for Teaching Statistics and Research Methods in the Behavioral Sciences" (see, Dunn, Smith, & Beins, 2007).

Clearly, researchers and teachers alike are giving considerable professional attention to teaching and teaching-related topics that pertain to the conduct and involvement of undergraduate students in research. Unfortunately, scholarship in this area tends to have addressed single issues (e.g., student-faculty research collaboration; see, Davis, 2007). *Developing, Promoting, & Sustaining the Undergraduate Research Experience in Psychology* is definitely a book whose time has come; it is the first major attempt to bring together chapters on all aspects of undergraduate research by recognized authorities in the field. Hence, I am sure you will agree with me that it marks a significant step forward in the scholarship in this area.

As you will see from Richard L. Miller's *Introduction* and the table of contents, this new e-book leaves no topic related to student research uncovered. Thanks to a dedicated group of authors and editors, you will find all of the chapters are well-written, informative, and important. Because they take student research into the very important realm of student professional development, I believe that Sections 5 and 6 deserve your special scrutiny. However, regardless of your primary interest(s) in student research, you will find it in this e-book.

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# Introduction
# &
# A Brief History of Undergraduate Research in Psychology

## What Is Undergraduate Research?

In 1891, James Mark Baldwin (APA President, 1897) set up a working psychology laboratory at the University of Toronto. In 1893, he hired August Kirschmann, a student of Wilhelm Wundt, who became director of the lab. Under Kirschmann's direction, undergraduates in their senior year conducted empirical research following his dictum that "no experimental work of advanced students should be done for the mere sake of practice, but that it should contribute to the solution of some problem."

In his 1997 article in the CUR Quarterly, Tom Wenzel echoes Kirschmann's dictum by defining undergraduate research as an "inquiry or investigation conducted by a undergraduate that makes an original intellectual or creative contribution to the discipline." Wenzel goes on to point out that this definition provides a great deal of flexibility and makes no distinction between faculty or student initiated work or student faculty vs. student-student collaboration. The definition does require that the research be original in that it add to our knowledge base and that it contribute to the discipline, which requires some form of dissemination of the results.

In their definition of undergraduate research, the American Chemical Society's Committee on Professional Training suggested that an ideal undergraduate research project should:

- *have a clearly communicated purpose and potential out-comes,*
- *have well-defined objectives and methods,*
  *be substantial in scope (as opposed to a collection of small projects),*
- *have a reasonable chance of completion in the available time,*
- *require contact with the professional literature,*
- *avoid repetitive work,*
- *require use of advanced concepts*
- *require a variety of techniques and instruments (not exclusively library work)*
- *culminate in a comprehensive written report.*

The process of conducting research is another important part of the definition. Undergraduate research is not just research; it is also a pedagogical process that if done well can (a) change the students' peer group into one that values the world of ideas, (b) increase faculty-student interaction outside the classroom, and (c) promote student engagement and intellectual development by increasing time-on-task. In conducting research, students are transformed from passive to active learners. They are better able to think critically and creatively, and they become savvier information consumers. Ideally, undergraduate research experiences provide a number of benefits beyond just the creation of new knowledge. Some of the benefits of creating new knowledge include increased self-confidence and a sense of accomplishment in being the first person to know something, learning how to persevere at a task because many experiments will not work out as originally planned, development of self-discipline and leadership skills, the ability to solve technical and procedural problems, and for many, clarification of their career goals as they get a taste of what professionals in the field really do.

In their article entitled "Seven Principles for Good Practice in Undergraduate Education," Chickering and Gamson outline seven principles that enhance the teaching/learning process. They suggest that good practices:

- *encourage student-faculty contact*
- *encourage cooperation among students*
- *encourage active learning*
- *provide students with prompt feedback*
- *emphasize time on task*
- *communicate high expectations*
- *respect diverse talents and ways of learning*

Former Psi Chi National President Peter Giordano has suggested that "research is the best way to travel" and it is clear that undergraduate research provides a meaningful opportunity to achieve the seven principles described by Chickering and Gamson.

This e-book is designed to be a hands-on publication that provides faculty, departments, and institutions with examples, suggestions, and best practices in developing, promoting, and sustaining undergraduate research in ways that foster the achievement of the goals outlined above. Our goal is that readers will be able to use this e-book in a very practical way to answer questions, generate ideas, and adapt the information to their special circumstances. The book provides models that can be

used at community colleges, commuter colleges, liberal arts schools, and comprehensive universities as well as research universities. Different ways of structuring a research program are described that should be useful for departments and colleges, while the descriptions of the different types of research that can engage undergraduates should be of considerable interest to individual faculty.

## Undergraduate Research in Psychology: An Historical Overview

In 1898, Cornell University Professor E. Bradford Titchener pointed out that in the 20 years since Wilhelm Wundt instituted the first psychological laboratory at the University of Leipzig, a radical and far-reaching revolution had been inaugurated, a revolution based on the influence of the experimental method. Laboratories had been established in all the principal universities of the United States, and from the beginning, these laboratories were designed for instruction as well as research. In his *Report of the Commissioner of Education for the year 1890-'91* (Vol. 2, pp. 1139-1151), Walter O. Krohn described the facilities in experimental psychology at many of the colleges and universities in the United States.

At this very early date, it is clear that a number of these laboratories provided opportunities for undergraduate students to engage in empirical research. For example, Brown University offered an advanced elective course for seniors that consisted of "original research in the laboratory and seminary for papers and discussions." E. B. Delabarre established the psychology laboratory at Brown in 1892. At Wellesley College, work in experimental psychology began in 1891 under the direction of Mary Whiton Calkins, and in that first year, students were involved in a "statistical inquiry into cases of colored hearing and of forms for numbers, months, and the like."

At this time, the University of Wisconsin offered a course in advanced experimental psychology, in which "each student takes up a special problem and prepared an account of the results of his work." The UW lab was established by Joseph Jastrow in 1888. One of the most influential educators of the time was Harry Kirke Wolfe, who established a psychology laboratory at University of Nebraska in 1889. Wolfe encouraged all students in psychology to do laboratory work. Wolfe believed that research was the most important pedagogical tool available to a teacher and he was able to inspire his students with an appreciation of the importance of research by involving them in the process of discovery.

Many of the early pioneers in psychology began their careers with undergraduate research. Among those who would later serve as president of the American Psychological Association was Walter Hunter, (APA President, 1931) who conducted a study of the maze behavior of pigeons during his senior year at the University of Texas, which under H. A. Carr's guidance was published in the *Journal of Animal Behavior* in 1911. In 1912, Clark Hull (APA President, 1936) conducted an undergraduate research project on learning under the direction of J. F. Shepard at the University of Michigan. L. L. Thurstone's (APA President, 1933) undergraduate degree was from Cornell in engineering and while there he was involved in several research projects on the transmission of sound through a light beam, as well as machine design. When Charles Judd (APA President, 1909) was a senior at Wesleyan in 1894, he co-authored a paper on visualization with his mentor, A. C. Armstrong, which was published in *Psychological Review.*

In his senior year (1898), Knight Dunlap (APA President, 1922) conducted research that he remembers as involving "two terrible spring-driven color mixers" (p. 38-39) supervised by George Stratton at the University of California. Margaret Floy Washburn (APA President, 1921) conducted research on the application of Weber's Law to the two-point threshold under the supervision of J. McKeen Cattell (APA President, 1895) at Columbia and it was her work there that led to her acceptance into the graduate program at Cornell in 1892. Another of Cattell's students was Shepard Ivory Franz (APA President, 1921), who began his experimental work as a senior in 1893. In 1910, Karl Lashley (APA President, 1929) conducted research for his undergraduate thesis at the University of West Virginia on the histology of the digestive tract of chimeroid fish. This work was instrumental in his receiving a graduate teaching fellowship at the University of Pittsburg.

Walter Pillsbury (APA President, 1910) was an undergraduate student of Harry Kirke Wolfe at the University of Nebraska where he, like many students, participated in research on psychophysics that was compiled by another University of Nebraska alumnus, Joy Paul Guilford (APA President, 1950), and published after Wolfe's death. Other students of Wolfe who went on to become president of the American Psychological Association include Madison Bentley (1925) who, during his senior year, served as Wolfe's lab assistant, and Edwin Guthrie (APA President, 1945), who was a student at Lincoln High School when he first met Wolfe. Both Bentley and Guthrie commented that Wolfe had influenced them more than any other mentor.

In his 1895 *Psychological Review* article on "The New Psychology in Undergraduate Work," Wolfe extolled the value of involving undergraduate students in research. In a survey conducted in the 1920s, his undergraduate lab ranked third in producing students who would later attain doctorates and influence the field. While neither Wolfe nor his students received credit for their lab work, enrollments in the lab courses increased dramatically over the years. He once remarked that the students "came for the grade and stayed for the zest." The purpose of this book is to assist faculty in creating an undergraduate research program that captures that zest.

## Exemplars Who Mentored Undergraduate Research

On the cover of this book are four individuals whose record of mentoring undergraduate student research in psychology is outstanding: Harry Kirke Wolfe (1858-1918), Mary Whiton Calkins (1863-1930), Margaret Floy Washburn (1871-1939), and Stephen F. Davis (1942-). These influential teachers possessed a teaching style that made students feel welcome in the laboratory. They encouraged students to take an active role in conducting original research, and they collaborated with an extraordinary number of undergraduate students on research projects.

### *Harry Kirke Wolfe*

Harry Kirke Wolfe (1858-1918) was the second American to receive a doctorate in Wilhelm Wundt's lab in 1886, four months after James McKeen Cattell became the first. Wolfe returned to America and founded one of the earliest psychology laboratories at the University of Nebraska. His research interests included developmental psychology, cognitive processes, and educational issues. His greatest contribution to psychology was as a teacher who inspired a large number of undergraduates to pursue advanced degrees in psychology. Among his better known students were three presidents of the American Psychological Association: Madison Bentley, Walter Pillsbury, and Edwin Guthrie, all of whom listed Wolfe as the person who had the most influence on them before they received their doctorate. During his professional career, Wolfe worked tirelessly to enhance the education of his students, working with them individually and campaigning for better laboratory facilities and equipment in his department at the University of Nebraska, where he founded the psychology lab in 1889.

Wolfe was a very effective teacher who from modest beginnings attracted an ever-increasing number of students to his courses. His teaching philosophy put a premium on experiential learning and he insisted that students engage in research using laboratory equipment that Wolfe often purchased with his own funds. Typically, Wolfe spent about 35 contact hours with students each week, but received no credit for the laboratory hours that he added to his courses. Students in his yearlong experimental psychology course engaged in studies of time perception, the speed of mental operations, and Weber's law. With this grounding, students could then engage in original research projects. Interestingly, his students received no academic credit for the hours they spent in research, and yet there was an ever-increasing number of students enrolled in his classes. An example of this work is a published study conducted by Frances Duncombe, who in the course of a child study class taught by Wolfe, examined children's ideas about Santa Claus. In fact, in a survey in the 1920s, Wolfe's undergraduate laboratory ranked third in producing students who would later attain doctorates and exert influence in the field. His commitment to involving undergraduate students in research is clear in an article he published in the Psychological Review in 1895 that encouraged other colleges and universities to include practical work, even for students in beginning classes.

Wolfe was a charter member of the American Psychological Association, although he held no offices in the organization. He also helped found *The American Journal of Psychology*, the first American journal in the discipline. Wolfe only published a few articles in the journal, devoting most of his written work to papers whose goal was to improve educational practices. He was also a leader in the child study movement that was initiated by G. Stanley Hall and engaged in research with his students to learn all there was to know about children, including their physical and mental characteristics, attention span, religious ideas, sense of humor, etc. Most of his publications were in the *North Western Journal of Education,* including works on the beginnings of speech, imagination and emotion, as well as studies of children's defects: color blindness, hearing problems, fatigue and nearsightedness.

Despite his success as a teacher and his popularity with teacher and parent groups in the region, Wolfe was frequently involved in disputes with the administrators at the University of Nebraska over laboratory space, funding, and equipment. In

1897, Wolfe was required by the University's new chancellor to explain his budget deficit of $75.86. His defense was that he did not "consider these expenses as deficit" and that he would continue to "provide any needed inexpensive article for my work without reference to the condition of my departmental fund." Perhaps it was this attitude that led to his being fired, despite a petition from 1000 students requesting his reinstatement. In keeping with his commitment to teaching, Wolfe went on to serve as superintendent of public schools in south Omaha for 5 years and principal of Lincoln High School for another 3 years. With the acquisition of a new Chancellor, Wolfe returned to the University where he taught for another 12 years.

Wolfe cared about the personal as well as the intellectual development of his students. He was a supportive and engaging teacher who gave enormously of his time and energy. One of the messages his students received was the importance of ethics. Wolfe had a well-defined code of ethics that caused some people to think of him as brave and courageous while others considered him merely difficult and self-righteous. Wolfe was never one to "go along in order to get along." During the First World War, Wolfe's patriotism was questioned and he was tried, albeit acquitted, for "not showing full support for the United States government's actions in the war with Germany." Some University faculty were forced to resign, but Wolfe was not among them. Still, the process was painful to Wolfe and may have contributed to his early death at age 59 from a heart attack. For more about this fascinating teacher, I recommend Ludy Benjamin's book: *Harry Kirke Wolfe: Pioneer in Psychology*, published by University of Nebraska Press, which although now out-of-print, is available from used book dealers (see http://www.abebooks.com/)

***Mary Whiton Calkins*** (Founded the Wellesley College Lab in 1891)

Mary Whiton Calkins began her college education at Smith College but was forced to return home for her junior year in order to tutor her younger siblings after her sister's death in 1884. She completed her education with degrees in both philosophy and the classics and upon graduation joined her family for a yearlong excursion to Europe. After her return to America, she got the chance to teach Greek at Wellesley College where she proved her teaching skills in instructing students in Greek as well as philosophy and psychology. Though she had no formal training in psychology, she was appointed to the newly created position in experimental psychology. To fully qualify for the position, she attended Clark University to study psychology with Edmund Sanford, and Harvard University to study philosophy with William James and Josiah Royce. At Harvard, she also studied with Hugo Munsterberg, investigating memory processes. While Calkins completed all of the requirements for a Ph. D., Harvard refused to grant her the degree because she was a woman, although Radcliffe, Harvard's sister school, offered her a doctoral degree which she politely refused, citing the fact that all of her work had been done at Harvard.

Calkins set up the psychological laboratory in an attic room at Wellesley in 1891, which was one of only 12 labs in North America and the first lab at a women's college. In the Fall of 1892, Calkins offered a course in Psychology including Experimental Psychology. In this inaugural year, fifty-four students worked in Calkins' lab, where they conducted research on sensation, attention, association, space perception, memory, imagination, and reaction time. Student co-authored articles published in the *American Journal of Psychology* covered a broad spectrum of topics including aesthetics, children's emotions, moral consciousness and dreams. For example, one student conducting research on imagination, studied the presence of a "continued story" which was never written down, seldom discussed, but very significant in a person's emotional life. In the area of dreams Calkins and her students found that dreams had content traceable to either external or organic stimuli. Two of her students, Florence Hallam and Sarah Weed conducted research on the relative proportion of pleasurable vs. disagreeable dreams that was praised by Sigmund Freud.

Calkins was a prolific scholar who published close to 70 articles in psychology and almost 40 articles in philosophy, as well as books such as "The Persistent Problems in Philosophy." Her most innovative work was in self-psychology, which emphasized the social nature of the self. In a series of papers published in the *Philosophical Review* in 1900, she denounced "the misleading treatment of the self as metaphysical presupposition" and maintained that selves "may be treated as facts for Science, since they are taken for granted without inquiry about their bearing on 'reality,' and... are critically observed and classified on the basis of their relation with each other and with facts of every other order." She went on to relate the self to both consciousness and perception.

In 1903, Calkins was ranked 12$^{th}$ in a list of the 50 most important contributors to the field. She was elected president of the American Psychological Association in 1905, its first woman president and in

1918 became president of the American Philosophical Society. She received honorary degrees from Columbia University as well as Smith College and received an honorary membership in the British Psychological Association in 1928. For more information on Mary Whiton Calkins, consult her autobiography, published in Carl Murchison's *History of Psychology in Autobiography,* available at http://psychclassics.yorku.ca/Calkins/murchison.htm.

### ***Margaret Floy Washburn*** (Founded the Vassar lab in 1903)

Despite her early love of chemistry and French, in her senior year at Vassar, Margaret Floy Washburn's dominant intellectual interests were in science and philosophy, which led to her decision to pursue a career in Psychology. She studied with James McKeen Cattell at Columbia who initially put her to work in determining whether Weber's Law held for the two-point threshold on the skin. Washburn improvised an apparatus, used a metronome to provide a constant rate of stimulation and found that it did not hold. Despite Cattell's support, Washburn was not allowed to enroll for graduate study because she was a woman.

Eventually, she went to Cornell University where she studied with Edward Titchener. While there, she worked on tactual space perception, which, after a 3-hour oral examination by Titchener, resulted in an MA *in absentia* from Vassar. Cornell University awarded her a Ph. D. in 1894. She was the first woman in America to receive a doctorate in psychology. After a six-year sojourn at Wells College and a year at the University of Cincinnati, she was offered an Associate Professorship at Vassar where she spent the rest of her academic life.

By the time she returned to Vassar in 1903, Washburn was listed among the 1000 most important "men of science" and had been appointed cooperating editor of the American Journal of Psychology, a title she held until her death in 1939. Her choice of Vassar was based partly on her desire to be near her parents who lived 16 miles away, as well as the opportunity to be close to several friends including William James, Josiah Royce, and Robert Woodworth, as well as Leta and Harry Hollingworth. She was a popular teacher whose students reported that her "lectures were brilliant, exact, clear with a wealth of references." In 1903 she established the psychology lab at Vassar.

Between 1905 and 1938 Washburn published 68 studies from the Vassar Psychological Laboratory with 117 undergraduate students as joint authors. Washburn would determine the problem and method of study while the students conducted the actual experimentation and formulated the results. For example, Anna Taylor conducted a study on "The Sources of the Affective Reaction to Fallacies" in which students were asked to introspect the impressions produced by considering several logical fallacies. Hazel Leach conducted another study that also appeared in the American Journal of Psychology. Her study, entitled "Some Tests by the Association Reaction Method of Mental Diagnosis," used a word association, reaction time procedure to study deception. In 1912, one of her students proved red-color blindness in rabbits and also discovered that rabbits react to the relative rather than the absolute brightness of colors. Another student, Edwina Kittredge, proved that a bull-calf was also red color-blind, which supported the finding that it was not the color that angered bulls in the bullring. During the late 1920s, Washburn and her undergraduate students undertook research on human emotions that examined sources of pleasure, anger, and fear in groups of Italian and Russian Jewish women in New York and Chicago.

Washburn's most notable research was in the area of animal psychology and her book, *The Animal Mind*, published in 1908, was the first book in the field by an American and became the standard textbook in comparative psychology for the next 25 years. Washburn was elected president of the American Psychological Association in 1921, served as chair of Section I of the American Association for the Advancement of Science in 1927, and was elected to the National Academy of Sciences in 1931, the second woman ever chosen for that honor. In 1932, she was the U. S. delegate to the International Congress of Psychology in Copenhagen. Margaret Washburn's autobiography was published in Carl Murchison's *History of Psychology in Autobiography,* available at this website provided by Chris Green: http://psychclassics.yorku.ca/Washburn/murchison.htm.

### ***Stephen F. Davis***

Our final "pioneer" pictured on the cover of this book is the author of the Foreword, Stephen F. Davis. Until his retirement in 2001, Dr. Davis was a Roe R. Cross Distinguished Professor at Emporia State University, Emporia, Kansas. Currently, he is a visiting distinguished psychology professor at Texas Wesleyan University in Fort Worth, Texas.

Dr. Davis received his Ph.D. in General Experimental Psychology from Texas Christian University. When he left TCU for King College (Bristol, TN), followed by an appointment at Austin Peay State University (Clarksville, TN), he was a hard-core rat runner trained in the Hull-Spence tradition. Fortunately, he was able to attract several students to work with him on olfactory communication and several co-authored presentations and publications resulted from these efforts. However, as additional students became involved with his lab group, he found that not all of them shared his burning passion to investigate olfactory communication in animal maze learning. In fact, a few of his students began to propose some of the "strangest" (at least to an old-time rat runner) research he could imagine, including "personality characteristics of civilian and military policemen," "an analysis of the size of human figure drawings and level of self-esteem in school-age children," "the Type A behavior pattern and level of self-esteem," and "death anxiety in military couples."

Dr. Davis had the presence of mind not to dismiss these, and similar, research ideas brought to him by his students. During his incredibly productive career, he found his research focus shifting, and to the dismay of his dissertation director, all of those hours invested in teaching him the importance of programmatic research seemed wasted. Dr. Davis had come to the realization that his laboratory and professional interests did not exist for any specific type of research; they existed for the training of quality students. As a result, his research and most of his professional activities were student driven and rather eclectic. In a short note written on the occasion of his retirement from Emporia State, he noted, "the trip has been superb!"

Dr. Davis's research interests include academic dishonesty, student professional development, student responsibility, conditioned taste aversion learning, and olfactory communication in animal maze learning. Since 1966 he has published over 270 articles and textbooks and presented over 800 professional papers; the vast majority of these publications and presentations include undergraduate and graduate student co-authors. Two of his presentations that highlight his involvement with undergraduate student research are "Academically Dishonest Rats Consume Yucky Tasting Stuff Before Engaging in Discrimination at the Shopping Mall," and "The Elixir of Professional Development for You and Your Students." Steve Davis's career has been spent in schools that do not have a competitive admissions policy, national reputation, or sizeable endowments. Thus, his considerable record of research activity has been maintained by the reinforcing value of continued interaction with his students.

Dr. Davis is a Fellow of the American Psychological Association Divisions 1 (General), 2 (Society for the Teaching of Psychology), and 6 (Behavioral Neuroscience and Comparative Psychology). He has served as the President of APA Division 2 (Society for the Teaching of Psychology), the Southern Society for Philosophy and Psychology, the Southwestern Psychological Association, and Psi Chi (the National Honor Society in Psychology). In 1987 Dr. Davis received the first annual Psi Chi/Florence L. Denmark National Faculty Advisor Award. In 1988 he received the American Psychological Foundation Distinguished Teaching in Psychology Award, and in 1989 he received the APA Division 2 Teaching Excellence Award. In 2004, he received the Society for the Teaching of Psychology Presidential Citation for Career Contributions

In support of the publication of undergraduate research, Dr. Davis served as the inaugural editor of *The Psi Chi Journal of Undergraduate Research.* In his inaugural editorial he articulated the purpose of the journal, which also describes his personal philosophy regarding undergraduate research: "The twofold purpose of this journal is to foster and reward the scholarly research efforts of undergraduate psychology students and to provide them with a valuable learning experience. The reader should bear in mind that these studies are possibly less complex in design, scope, and sampling than professional publications and are not limited to significant findings. The basis for accepting a paper for publication is the agreement among three professional reviewers that the project, hypothesis, and design are well researched and conceived for someone with an undergraduate level of competence and experience."

Dr. Davis's impact did not end in lab with his students; he spread his passion for student research to others when he founded both the Association for Psychological and Educational Research in Kansas and the Great Plains Students' Psychology Convention. Today, more than 500 students and faculty gather each year in March to celebrate student research largely due to Steve Davis's vision and passion that has ignited colleagues across several States.

## Purpose of this E-book

Over the past several years, there has been an increase in the emphasis on conducting research as part of the undergraduate educational experience in many disciplines including psychology. Organizations such as NCUR (National Conference

on Undergraduate Research) have provided a national forum for presenting research. CUR (Council on Undergraduate Research) has provided guidance to institutions and faculty for fostering undergraduate research in many disciplines. In addition, Sigma Xi: The Scientific Research Society, has added an undergraduate research showcase to their annual meeting, and undergraduate research is displayed annually in the U.S. Capitol and in many State Capitols in the Posters on the Hill program.

In psychology, the national and regional conventions have featured undergraduate research sessions and a number of regional student conferences have emerged. Psi Chi has established a journal that publishes only undergraduate research and the Society for the Teaching of Psychology (STP) has various programs that support undergraduate research at both regional and national conventions as well as teaching institutes that emphasize the importance of undergraduate research. The underlying notion is that we learn psychology by doing psychology and one way to do psychology is through research.

As this surge in undergraduate research has occurred, it is clear that there are many different models for conducting research with undergraduate students. The purpose of this book is to provide a comprehensive overview of the many ways to conduct undergraduate research in psychology with practical suggestions and models for how one can both develop and enhance a research program that involves undergraduate students.

## Organization of the Book

The book begins with a panel discussion in which leading experts in the area of the teaching of psychology address the question: Why engage undergraduates in research? Several topics are discussed including how to structure the curriculum to promote undergraduate research, the departmental resources needed to support undergraduate research, ways to excite students about conducting research, rewarding faculty who promote undergraduate research, and the benefits of undergraduate research. The book is then divided into seven sections that each address a different aspect of the undergraduate research experience.

### *Section 1: Institutionalizing Undergraduate Student Research*

This section of the book addresses undergraduate research on a grand scale as part of the academic culture and provides information on support mechanisms available for undergraduate research.

In the opening chapter, Steve Barney reviews the literature that suggests the status of American higher education is in a state of crisis. Unlike the academy of the past, colleges and universities seem to be less sensitive and responsive to the needs and demands of society. Moreover, undergraduate students who pay the lion's share of tuition are often given the least amount of experiential learning and mentorship with faculty. Barney asserts that the time may be at hand for a large-scale cultural shift in higher education. Establishing undergraduate research as a standard may help meet the growing needs of society and fulfill the social contract institutions of higher learning have with undergraduate students.

In chapter 2, Mike Nelson and Mitch Malachowski describe the Council on Undergraduate Research's *Institutionalizing Undergraduate Research Institutes*. Participants attend these weekend workshops to enhance the research programs on their campuses. The benefits and challenges that institutions in attendance realize are discussed and evaluated and the outcomes described. The authors focus the majority of their attention on those issues that are important to many different kinds of colleges and universities in order to draw generally applicable lessons that other institutions can employ.

In the chapter on institutional support mechanisms, John Falconer presents an overview of institutional mechanisms for supporting undergraduate research. Examples are drawn from several public and private colleges and universities around the United States, offering a range of approaches that can be adapted to various campus cultures. The chapter suggests methods of integrating students into existing research infrastructure, explores several approaches to administrative support, and describes campus-level programs that support student research. While every institution must develop student research mechanisms appropriate to its own mission, resources, and culture, this chapter will give the reader an understanding of common approaches in contemporary higher education.

In his chapter, Vincent Prohaska reviews the various sources and programs that fund and support research projects by undergraduate students. Included are descriptions of each program, eligibility criteria, deadline dates, and links to web sites.

The final chapter in Section 1 is on research ethics. Rick Miller outlines some of the issues that the student researcher and his or her mentor need to keep in mind when conducting research, and describes online training programs available for

teaching research ethics. Some of the issues addressed are ethical concerns in recruiting participants, informed consent, the use of deception, maintaining confidentiality, debriefing, and ethical issues in conducting research with vulnerable populations.

## *Section 2: Successful Models of Undergraduate Research*

This section describes several successful models of undergraduate research in psychology at a variety of institutions. In the first part of this section, university-wide models are described and in the second part, departmental models are described.

Christopher Lind provides an in depth look at the University of Wisconsin-Eau Claire as a model public institution for supporting undergraduate research. The university is a Center of Excellence for Faculty/Student Research Collaboration and has been recognized by the *Chronicle of Higher Education*, *USATODAY*, *U.S. News & World Report*, and the National Conference on Undergraduate Research. This chapter describes the growth and development of the Center of Excellence, its current programs, and a unique student approved "differential tuition" mechanism to fund faculty/student collaborative research at the University of Wisconsin-Eau Claire.

Kenya Taylor presents a detailed description of the evolution of undergraduate research at the University of Nebraska at Kearney. She describes the growth and development of undergraduate research and current programs and opportunities available to students and faculty. An analysis of activities and direction for future expansion and sustainment of the undergraduate research culture is provided.

Ken Keith, Lisa Baird, and Michael Ichiyama describe the Summer Undergraduate Research Experience (SURE) program of the University of San Diego. SURE is a program of competitive research grants that fosters student-faculty collaboration and encourages involvement of undergraduate students in meaningful scientific activities. The program is multidisciplinary in nature, and is managed by faculty coordinators chosen from the participating departments. The Department of Psychology has been a key player in SURE, and student participants have presented and published their research in a variety of venues.

Based on her experience at Utah State University, Joyce Kinkead describes a fellowship program for undergraduates that places them in intensive research experiences from day one of their undergraduate careers. Fellows may study any field, ranging from biochemistry to violin performance. She explains the nuts and bolts of fellowship selection, oversight, and mentorship as well as noting grant programs to support the research and disseminate the results of their projects.

In his chapter, John Mateja describes the creation of the Undergraduate Research and Scholarly Activities (URSA) office and the range of activities that he and the URSA Advisory Board have worked to develop at Murray State University. Included among the programs is *Posters-at-the-Capitol*, a program organized by Murray State that enables undergraduates from all of Kentucky's public universities to present their research to members of the Kentucky legislature and governor, *Scholars Week*, an annual celebration of the scholarly work of over 1000 MSU students, and the *Distinguished Mentor Award*, which recognizes faculty for their mentoring efforts. He concludes his chapter with a discussion on "lessons learned."

Lynn White provides a detailed description of the evolution and impact of Southern Utah University's successful departmental model for a culture of undergraduate research. Intradepartmental and central administrative demographic variables and policies are discussed which both helped and hindered the development of this culture. Among them are faculty attitudes, workload and curricular issues, student attitudes, opportunities for faculty development leave, rank, and tenure policies, and centralized programmatic administrative support.

Susan Burns' chapter describes the research opportunities provided to students at Morningside College in Sioux City, Iowa, a predominantly undergraduate teaching institution with 1,400 students enrolled from 25 states and 8 countries. Within this chapter she discusses the variety of characteristics that make Morningside College's Psychology Department a successful model for undergraduate research: integration of research in a variety of lab (research-based) courses, group research opportunities, the senior thesis requirement for all psychology majors, and student coordination of and presentation at a cross-discipline campus-wide student research symposium. A description of each of these features discussing details and benefits for students and faculty is offered.

Bill Krantz and his colleagues describe the psychology major at Hanover College and its integration of student research. The major is designed to have students design and conduct research several times in the course of the major. At a minimum, students design and conduct four research projects. These research projects occur in a wide variety of courses exposing students to

numerous designs and statistical methods. The major culminates with a year-long research project.

Christie Cathey and Gwen Murdock present Missouri Southern State University's model for engaging undergraduates in psychological research. They first describe the Department of Psychology's curriculum for majors, which includes a three-course research preparation sequence and a required senior thesis research project. They then discuss additional opportunities for undergraduate research and for funding this research, including opportunities for students to travel and conduct research abroad, which is supported by Missouri Southern's Institute for International Studies. Finally, they provide evidence for the success of this model.

In his chapter, Roy Smith describes a long-standing undergraduate research program at the University of Mary Washington. After explaining how the faculty has carefully integrated research experience into all levels of the undergraduate curriculum, he lists the particular advantages that justify investing in a comprehensive program of undergraduate research.

Collaborative research among psychology students and faculty members has a long and distinguished history at Furman University. Brewer, Einstein, and Pontari highlight certain aspects of this critical component of their curriculum that is available to all qualified psychology majors. These research opportunities arise from several facets of Furman's program, including independent research and internships. In addition, the authors discuss funding sources for remunerating students and faculty members engaged in collaborative research. A local research and internship conference celebrates research and is a smashing success.

Bill Lammers describes a comprehensive strategy to promote undergraduate research at the University of Central Arkansas, which includes an emphasis on research at Psi Chi and Psychology Club meetings, an informal seminar to prepare the best majors for graduate school, research participation in the General Psychology course, research proposal development in the Research Methods course, a separate (three credit hours) Research Methods Lab course, availability of Independent Readings and Independent Research courses, an Undergraduate Scholar program, student travel and presentation at conferences, financial support and recognition of student research, and a departmental atmosphere that supports student research.

## *Section 3: Conducting Undergraduate Research*

In this section, many of the ways in which the undergraduate research experience can be promoted are presented. This section will be particularly useful for individuals who want to establish an undergraduate research program in their department and are in need of concrete examples.

In their chapter, Emily Balcetis and Rick Miller suggest that small group research improves the undergraduate first-year experience by promoting student engagement through collaborative research. This chapter describes institutional programs that implement small group research designed to recruit freshmen in general and specific factions of the freshmen class including honors students, at risk students, students from underrepresented groups, and those with clearly defined career goals. In addition, they discuss benefits and problems of implementing such programs including educational gains, personal development, social loafing, time management, and negative social outcomes. They end by suggesting strategies for optimizing the benefits and avoiding common pitfalls.

Eric Amsel and Theresa Kay address the nature and justification of a new lower-division undergraduate course in psychology. The course is titled *The Science and Profession of Psychology* and is designed to promote student's understanding of the discipline and engagement in undergraduate research. They review the conceptual barriers preventing psychology students from understanding the science of psychology and address the importance of students having meaningful but scaffolded research experience early in their academic careers so they can adequately grasp the scientific nature of the discipline.

Research methods and statistical skills are important for all undergraduate psychology majors, and faculty want to maximize student understanding and acquisition of these skills. Cathy Grover and Kenneth Weaver describe an integrated, sequential two-course approach the department at Emporia State University adopted in 2003. In this approach, descriptive methods and descriptive statistics constitute one course and experimental methods and inferential statistics constitute the second. Thus far, the benefits of this approach include students completing correlational and experimental studies, writing two research papers in APA format, and presenting orally to their peers and in poster format to the department.

Bernard Beins outlines a successful three-semester program of undergraduate research in the undergraduate curriculum at Ithaca College. This Research Team program, which is required of all psychology majors, provides students with the opportunity to develop research skills over time while working closely with a faculty member and other students. Students value this experience as part of their learning. Although the program is costly to the department in terms of faculty resources, there is strong support from both students and faculty. The outcomes include significant numbers of student conference presentations and successful admissions to graduate programs.

Bill Wozniak describes a model that incorporates advanced undergraduate psychology laboratory courses as a vehicle for conducting undergraduate research. Although not identical to traditional laboratories in the natural sciences, these labs afford students the opportunity to work with faculty in developing, implementing, and writing up a research project. The advantages and disadvantages of advanced psychology labs are presented.

Cal Garbin and David Hansen describe the undergraduate research process at the University of Nebraska at Lincoln. At UNL, students engage in research using large multivariate data sets provided by various agencies to conduct sophisticated analyses in a quantitative methods course.

In his chapter on Mentoring Undergraduate Research in a Principles of Assessment Course, Steve Barney describes his efforts to inspire a culture of undergraduate research in his psychometrics class. Students participate in research teams and complete projects examining the reliability and/or validity of measurement instruments, surveys, or tests. He writes about how his class serves as a data collection site for various publishing companies who are continually developing and assessing new instruments. The student projects often contribute to developing the norms and initial psychometric properties that appear in published test manuals. This real-world application of students' findings makes the research projects more interesting and relevant.

Undergraduate independent research projects offer an exceptional opportunity to truly immerse students in the understanding of psychology as a science. Because the actual process of involving students in independent study should be tailored to the specific advisor and student pairing, Susan Burns' chapter offers suggestions regarding broader issues of selecting students, planning and supervision of independent research projects, common pitfalls and warnings for students and faculty, and benefits associated with independent study.

Community colleges present distinctive challenges for faculty desiring to provide early mentoring of students interested in research. Jennifer O'Loughlin-Brooks and Valerie Smith offer suggestions for overcoming the obstacles particular to the two-year campus in establishing a research program. Offered are strategies for student recruitment, engendering institutional support, and creating an agenda and calendar that is manageable for both traditional and non-traditional students.

Vincent Prohaska discusses the unique challenges involved in conducting research with non-traditional students at commuter colleges. Included are tips for recruiting students who might not know that research experience is valuable, helping students with work and family responsibilities manage their time, and getting the research completed.

Holly Tatum and Beth Schwartz describe the Summer Research Program at Randolph College, including its history, goals, and unique characteristics. They highlight the participation of the psychology faculty and students and describe how the summer research program complements and extends the psychology curriculum. Finally, they review recent research demonstrating the benefits of participation in a summer research program for undergraduate students.

The task of managing student research projects often becomes problematic, especially as class size increases. In his chapter, Ed Kardas describes the creation, design, and use of a password-protected FileMaker Pro Web database he has used since 2000. It allows the instructor to monitor and provide feedback about research ideas to students outside of class time. Students willingly submit their ideas without fear of broadcasting them over the entire Internet. Instructors can display the database periodically while they ask students for progress reports. Having an on-line repository of ideas helps develop a sense of community, both within the class and with previous classes. Analyzing the accumulation of research topics over time helps the instructor understand the kinds of research topics that interest undergraduates.

Beth Schwartz and Holly Tatum provide a review of the type of capstone courses found in undergraduate psychology programs and the types of institutions that include these courses in the curriculum. They include details of the Randolph College capstone course, in which students enroll in a two-semester course and gain experience with all aspects of the scientific process. Full details of the assignments and requirements for the course are included. Finally, they review the assessment methods used and refinements made in response to assessment results.

## *Section 4: Special Types of Research Opportunities for Undergraduates*

This section describes special research situations and how students and faculty can use these.

Joanne Altman discusses utilizing zoos as research partners. This allows students to study animal behavior at institutions that do not maintain animal facilities. She describes a variety of research topics students can investigate in a zoo setting and shares examples from the literature. Dr. Altman offers suggestions for how to forge a relationship with a nearby zoo and addresses some of the methodological and logistical challenges of working in a zoo environment. Despite the challenges, she advocates developing a research relationship with a local animal park. Zoo research on visitors or animals can be a transforming experience for the student researcher.

Maya Khanna discusses points to consider when conducting a community-based research project with students. Specifically, she provides suggestions for how to ensure that a project is appropriate for community-based research and how to ensure that students are ready for conducting this type of research. In addition, she stresses the importance of approaching community-based research as a joint venture between the researcher/instructor, the students, and, most importantly, the members of the community. In her discussion of community-based research, Dr. Khanna brings in aspects of her research experience to highlight both the benefits and difficulties of conducting community-based research with students.

Joseph Benz describes the techniques of field research and gives examples of how it is used to educate students about both non-humans and non-experimental research. He briefly describes the annual Sandhill crane migration through the Platte river valley and how it can be used as a mechanism for teaching naturalistic observation. He also provides a list of resources for teachers who want to use these techniques.

Kevin Klatt describes the development of the University of Wisconsin-Eau Claire Campus Autism Program (UWEC-CAP) and the role of undergraduate research in the program. The CAP serves children ages 1-5 who are diagnosed with a pervasive developmental disorder, usually autism. The program therapists include only undergraduate students who are pursuing a psychology major and are enrolled in a behavior analysis emphasis.

Mark Zrull discusses undergraduate research in a traditional behavioral neuroscience lab. He describes some goals of the research experience for students and faculty as well as some space, equipment and policy requirements typical for behavioral neuroscience research settings. He also describes the process by which undergraduates might find their way into this research setting. In addition, he offers the different skill sets an undergraduate may use and provides some thoughts about building and mentoring a well-functioning behavioral neuroscience research team.

The Chimpanzee and Human Communication Institute (CHCI) provides a unique opportunity for research and education about human's sibling species, chimpanzees. CHCI provides sanctuary for three chimpanzees that use American Sign Language in communication with each other and their human caregivers. Jensvold and Fouts describe research projects and data collection at the institute that involve undergraduate students. This includes archival written records, videotape records, and live observation of the chimpanzees. Research projects range from the study of chimpanzee sign language to environmental enrichment.

The chapter by Matthew Huss focuses on his experience involving students in a research experience at a maximum-security forensic hospital. Conducting forensic research with undergraduate students can be extremely rewarding and provides a real-life experience for them, which few other students are afforded. Working as part of a research team provides them an opportunity to learn the true capabilities of human beings, while learning a great deal about the interaction of the mental health and legal systems. Despite the challenges of working with young men and women on this sensitive research, the benefits certainly outweigh the costs.

Cindy Gibson provides information about opportunities for engaging undergraduate students in neuroscience research, advocating the collaborative apprenticeship model and supplying a variety of ideas and specific resources. She specifically addresses animal research considerations, summer research opportunities, and undergraduate neuroscience publishing. Dr. Gibson also discusses strategies for engagement in teaching laboratories and independent research projects that focus on undergraduate neuroscience skill development while taking challenges such as facility and budget resources into consideration.

John Krantz and Bill Altermatt discuss the nature of online research as well as the advantages and disadvantages of using online research for undergraduate projects. They outline the necessary resources for conducting online research and cover some common concerns, including recruitment, participant motivation, and ethics.

Britton Mace details several research opportunities for undergraduates in the National Parks. Successful projects focused on alternative transportation systems, soundscapes, and night sky visibility are provided as examples. Dr. Mace then reveals many of the challenges and obstacles involved in completing a field-based research project in the parks. Despite the trials and tribulations, students have found research in the parks to be one of the most educational and rewarding experiences of their undergraduate career.

Ruth Ault articulates practical folk knowledge about doing research with preschool aged children including such topics as securing a sample, locating research space, framing the experience to yield children's cooperation, coping with participants' (mis)behavior, considering safety and health concerns, and practicing the procedure. These suggestions should help instructors supervise undergraduates who want to work with 2- to 5-year-olds.

Jill Brown and Dan Foy discuss the epistemological questions that psychologists interested in qualitative work grapple with, providing a framework within contemporary constructivist worldviews. They review the literature about teaching qualitative methods in psychology and address challenges of teaching qualitative methods in the age of empiricism. Five major techniques are discussed (case study, phenomenology, life history, grounded theory, and ethnography) along with recommendations for readings within each technique.

Lizette Royer discusses the need among undergraduates to develop and use higher level critical thinking skills and points to the use of primary source materials as a way for students to do so in a history and systems of psychology course. She suggests that instructors must first teach students what primary source materials are, how to interpret them, and how the evidence obtained from them can fit within a greater historical context before bringing the material to the classroom. Examples of course work in which archival material/primary source documents were used by the instructor and the students are discussed.

## *Section 5: Faculty/Student Roles*

This section provides information on the various roles that students and faculty play in the research world. This section includes papers from both students and faculty.

Theresa Wadkins and Rick Miller discuss the process of mentoring that leads to the development of students' research skills. They describe mentor characteristics, the expectations of mentors and protégés and the challenges of mentoring. In general, they review many of the practical details to be considered as one decides whether or not to engage in mentoring undergraduate student research.

William Douglas Woody discusses collaboration with undergraduates from a faculty perspective. He defines collaboration and distinguishes it from other modes of working with undergraduates. He presents processes for selecting students along with goals, challenges, and advantages of collaborative work. He illustrates these processes with examples from his work with an outstanding undergraduate student. He concludes with specific recommendations about teaching ethical behavior, ethical concerns in collaboration with undergraduates, and recognition of the larger mission of collaboration.

Joseph Hamm discusses his first research collaboration experience under the mentorship of Dr. William Douglas Woody. Joe explains the process from a student perspective from his initial meeting with his mentor through decisions about topics and procedures, data collection and analysis, and eventual presentation and writing. He identifies effective practices and potential challenges within the context of that process to help both faculty and students develop the same fulfilling experience.

In the beginning of their chapter, Krista Forrest, Bradley Stastny, and Jennifer Bruns discuss the major differences between faculty driven and student driven research programs by focusing specifically on the conditions under which faculty driven programs are better suited. The authors then discuss the various costs and benefits associated with faculty driven research programs and the impact that these programs can have on professors and the undergraduate students who work with them. In closing, the authors present some practical advice for the implementation of faculty driven programs by using current research programs as examples.

## *Section 6: Sharing the Results of Research*

This section describes the many types of forums available to undergraduate students in which they can share the results of their research.

Donna Stuber-McEwen and Kristina Thielen-Belveal explore the beneficial impact of undergraduate conventions on students, faculty, and the profession. An overview of the common conference formats (i.e., national, regional, local, and asynchronous), along with alternative opportunities for presentation experience, is presented. Additionally, the barriers to student participation in conferences and the ways in which faculty may help overcome these are addressed. The authors contend that students' experience in attending and presenting

at undergraduate conferences is vital to their professional development

Undergraduate research forums are becoming more popular both at the department and university levels and are a great way to showcase undergraduate research for other students, friends, and faculty/administration. Participating students can also practice giving a professional poster or oral paper for future conferences or classes. Diane Martichuski describes an undergraduate research forum in the Department of Psychology at the University of Colorado at Boulder. She explains the logistics for her department, including an organizing timeline and poster display options, and also mentions other university departments, which have forums with aspects different from her own.

Organizing a campus-wide event celebrating undergraduate research can be a frustrating, yet extremely rewarding endeavor. In her chapter, Roxanne Sullivan provides examples of different approaches to campus-wide research days, as well as the benefits and challenges of these events for the university community.

Isabelle Cherney describes the benefits of participating in the yearly Posters on the Hill conference in Washington D. C. It provides background information on this conference sponsored by the Council on Undergraduate Research (CUR), an overview of the application process and tips on how to prepare for it, as well as a detailed description of what happens during the conference. It illustrates how this unique forum has contributed to building a culture of undergraduate research at Creighton University. In addition, several undergraduate students who presented at the conference for the past six years share their learning experiences.

Robert Rycek discusses student research presentations at professional conventions. He examines the benefits, challenges and responsibilities of presenting at a professional convention as opposed to a student conference. Recommendations for students and faculty mentors are made.

Rick Froman surveys the varieties of locally published undergraduate research journals in a wide range of institutions. These publications are designed to encourage high standards of scholarship in a department or college by rewarding excellence with publication. Some are also designed to provide advanced students with an opportunity to have real life experience in the peer review process. They also encourage a culture of scholarship and get students excited about doing research. They can also be used to provide guidance to new students, allowing them to build on the example of more experienced student researchers. A case study detailing the development of such a journal and the embedding of the publication process within the curriculum of a psychology department is described.

Mark Ware and Susan Burns examine the benefits to students and faculty of scholarly publication in journals whose primary goal is to publish the research of undergraduate students. Benefits for students include promoting critical thinking skills, encouraging collaborative learning, and refining communication skills. Benefits for faculty include reinforcing and extending their own scholarly skills, increasing motivation for teaching and scholarly undertakings, and enhancing knowledge and skills for teaching research. Their personal experience and the published literature indicate that students and faculty accrue numerous benefits from such interaction; faculty involvement in student scholarship is a win-win situation.

## *Section 7: Assessment and Evaluation of Undergraduate Student Research*

This section of the book emphasizes the overall value of undergraduate research and how to assess the outcomes of the undergraduate research experience.

CarolAnne Kardash, Michael Wallace, and Linda Blockus summarize data regarding science undergraduates' perceptions of the value of participation in undergraduate research experiences (UREs). Forty-four female and 28 male interns who engaged in UREs in various science disciplines at the University of Missouri-Columbia responded in writing to the question, "What are the most important things you learned from the research internship?" The top three responses were gains in scientific dispositions and habits of mind (78%), gains in research skills and insights into the research process (51%), and gains in general knowledge and skills (40%). These student-identified benefits are generally consistent with the gains presumed to result from participation in UREs.

Bryan Saville and Tracy Zinn discuss the role of research experiences in undergraduate psychology education and identify five important goals that research experiences help achieve: (a) knowledge of research methods, (b) the ability to think critically, (c) acquiring the values of a psychologist, (d) the ability to communicate effectively, and (e) personal and professional development. Saville and Zinn also provide tips for enhancing students' research experiences and discuss how these experiences can enhance students' personal and professional lives.

George Spilich discusses the benefits that a department can derive from careful assessment of student outcomes. He identifies the following major

steps in assessing the effects of an undergraduate curriculum upon students: (a) pre-planning the assessment in light of the institutional and departmental mission, (b) designing the assessment plan, (c) implementing the plan in a sustainable fashion, and (d) using the assessment to build a culture of continual curricular development. Common obstacles to success are identified and strategies to avoid such impediments are suggested. A list of web-based resources is provided for departments to consider as they conceive of and implement an assessment program that best suits their unique needs.

Linda Rueckert describes a variety of existing tools that can be used to assess the outcomes of student involvement in research. She discusses which tools are more appropriate for given outcomes and lists a number of published and online resources for faculty interested in locating existing tools or creating their own.

In his chapter on the value of undergraduate research in the workplace and community, Christopher Koch shows that the skills employers are looking for in employees correspond to the skills that students develop while engaged in the research process. He also presents strategies to help students identify and market these skills to employers.

Jennifer Johnson reflects on her research experiences as an undergraduate psychology student. She notes the necessity of beginning early as a "trained monkey" (completing the tasks of a research project that are so easy a trained monkey could do them) in order to learn the ropes and deal with the frustrations of each new task. She points out that the knowledge gained in helping other students with their research projects can help the student develop the ability to scientifically complete a personal research project.

In the final chapter in the section, Christopher Koch examines the importance graduate school admission committees place on undergraduate research. He suggests that graduate schools value undergraduate research for at least four reasons. Undergraduate research can help a student determine his or her area of interest in psychology, thereby allowing for a more focused search of graduate programs. Second, working with a faculty member on research can help yield better letters of recommendation. Third, undergraduate research provides an excellent opportunity to enhance several secondary criteria for graduate school admission. Lastly, engaging in research helps develop research-based skills that are important for success in graduate school.

## Acknowledgments

I want to thank our authors for their generous and thoughtful contributions to the e-book and our section editors for their careful critiques of the authors' work. The authors have had first hand experiences, and in their chapters they share their successes as well as the challenges in implementing the undergraduate research process. Our goal is that the reader will be able to use this e-book in a very practical way to answer questions, generate ideas, and adapt the information to their special circumstances. I hope you will find that this book achieves its goal.

Richard L. Miller
University of Nebraska at Kearney
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# Why Engage Undergraduates in Empirical Research

This chapter is based on a panel discussion held at the 72nd Annual Convention of the Rocky Mountain Psychological Association, Park City, Utah, on April 5, 2002 and subsequently published in the *Journal of Psychological Inquiry, 8,* 59-67. Additional material has been added from interviews with distinguished teachers of psychology that were also published in the *Journal of Psychological Inquiry.* The citations of the original interviews published in *JPI* are provided.

Members of the Panel included:

**Jane S. Halonen** *University of West Florida*

**Charles L. Brewer** *Furman University*

**Paul A. Bell** *Colorado State University*

**Richard L Miller** *U. of Nebraska at Kearney*

With questions and comments from members of the audience including:

**Bernard C. Beins** *Ithaca College*

**William Wozniak** *U of Nebraska at Kearney*

**Marty Fallshore** *Central Washington Univ*

**Susan Becker** *Mesa State College*

**Robert Rycek** *Univ of Nebraska at Kearney*

Additional comments provided by:

**Wilbert J. McKeachie** *Univ of Michigan*
*J. Psych. Inquiry, 4,* 42-51

**Elizabeth Loftus** *U. California Irvine*
*J. Psych. Inquiry, 10,* 61-67

**Robert Cialdini** *Arizona State University*
*J. Psych. Inquiry, 11,* 101-108

**Bill Buskist** *Auburn University*
*J. Psych. Inquiry, 12,* 38-47

**Margaret Matlin** *SUNY Geneseo*
*J. Psych. Inquiry, 6,* 53-59

**Richard M. Suinn** *Colorado State Univ.*
*J. Psych. Inquiry, 5,* 75-82

**Robin Anderson** *St. Ambrose Univ.*
*J. Psych. Inquiry, 9,* 123-132

**Drew Appleby** *IUPUI*
*J. Psych. Inquiry,* in press

## Why is Undergraduate Research Important?

**Halonen**: Undergraduate research. I have to go with a personal story. I was the quintessential undergraduate who wanted to help people. I saw no relevance of research to helping. You have probably seen one or two of these kinds of folks in your classes. That was me. Fortunately, the faculty that I worked with in my undergraduate program were much smarter than I and said: "Jane, at least pretend that you like research if you are serious about graduate school." So I did, and I was able to do some research, but I never caught fire with it. Now, I have since because I have had the good fortune of finding content areas that are interesting. But I think that kind of represents the challenge of training 25 or maybe even 30 years ago. That research was seen as the preserve of graduate students and their very important faculty. And undergrads, unless you were in an honors program or you were proven "good material", you really didn't have access to undergraduate opportunities.

I think it's critically important because it really is the way students end up catching fire. If they get those opportunities to design, build, run… there's nothing more exciting than having an undergraduate run an *F* test that's significant and watching them understand what that means. Things are so much better now. Research institutions are now holding symposiums on undergraduate research. Across the land there's recognition that this is where our scholars will come from. And I simply think that we are doing a better job of helping students get excited about research as powerful problem solving. So I think that is why this is an important topic for us to take on.

**Brewer**: Unlike Jane, I never wanted to help people. I was fortunate to attend an undergraduate institution of which you have never heard—a small liberal arts college in Conway, Arkansas called Hendrix College. Intellectually, I caught fire when I took General Psychology in my sophomore year with Professor John P. Anderson. I got the clear message that psychology is a science and, if you want to become a psychologist, you must first be a scientist. I probably imprinted on Dr. Anderson, because I still follow his example. In fact, I conducted three independent research projects as an undergraduate, so research was not new to me when I got to graduate school. In

recent years, more undergraduates are involved in meaningful research. Large research universities are now recognizing that our students from good liberal arts college have a real leg up when they get to graduate school. Our students have learned that, all other things being equal, which they never are, three things will distinguish them from other applicants. They are research, research, and research. Undergraduates who want to get admitted to good graduate programs should do research.

I tell students in my Experimental and Statistical Methods course that learning to do research is like learning to drive a car. You can read every book that has ever been written on how to drive an automobile, but you don't learn how to drive one until you actually drive one. Learning to do research is the same. You don't learn how to do research until you do research. Conducting meaningful research is one of the most important things undergraduate psychology majors can do. Why? Often students fail to relate things they learn in separate content courses, so they never see that courses are related to one another. Students finally see how all the separate pieces fit together when they start conducting research. So, I say, do more research!

**Miller**: Like Jane, I started out wanting to help people. I spent the summer between my freshman and sophomore year at the University of Washington on a WICHE scholarship in social work, which placed me in agencies, several agencies, none of which seemed to know what they were doing. I saw people trying to apply knowledge that just wasn't there. So, the thing that spurred me to research was the desire to actually know what one should do. It was years later that I realized that research was contingent and transient as well, but at the time the motivation was that we needed answers. We were doing things that we didn't understand.

After that summer, I did my first undergraduate research project at the beginning of my sophomore year and a second project in my junior year. The first project was published some years later, when I was flying for the U. S. Navy. My professor needed a publication for tenure. He thought that this was a great project that we had done. He ended up publishing it in a journal. I have never claimed that research project on my resume, because it was so awful. But, the value of it was that I got hooked. The idea that I could ask a question and would be the first person in the world who would know the answer and could then share that answer with everyone else. That was fascinating to me and I think it is fascinating for many undergraduates. Do research because you can set the question. You can find out what's going on. It's exciting. It's lifelong. Yes, it will get you into graduate school. Yes, it is a valuable in terms of learning methodological skills and research ethics. But all that aside, it's just an exciting endeavor in and of itself.

**Halonen**: Did the people who taught you research skills talk to you about research as a means to an end or as an exciting endeavor?

**Loftus:** Having undergraduates work in the lab and be a part of the whole research program is certainly essential for my program, and me but I think it is also wonderful for the students. For instance, if a student is just there for a quarter or two, at least they can learn something about how research is done. When you just read journal articles and only see the finished product, you don't realize how messy research actually is; how many decisions you have to make to clean it up along the way. It reminds me of sausage. You see the final product, but if you knew how it was actually made you'd have a totally different perspective. Maybe that's not a good analogy, but I think what is most valuable to me are those students who end up getting thoroughly immersed in the lab as an undergraduate. They do that most often when they are working on an honors project or they have something that requires them to be there for an extensive amount of time, perhaps a year or maybe even more. What I enjoy most is to see students, who worked a little bit on an extension of a study, changing a few but critical things and doing the study themselves. They feel a kind of ownership of the study, especially if it leads to publications or to graduate school. Having that research experience makes students more desirable when they apply to a graduate program. That's why undergraduate research really is a two way street; it is basically helpful for everyone when it goes well.

**Miller**: When I went to school, there were no other undergraduates at our institution that did an empirical research project. Years later it became a regular part of their program, but at that time it wasn't done. I'm old, guys, and the saurus brothers, both stego- and bronto- and I were in school together. Undergraduate research was not normative.

**Bell**: Unlike Dr. Miller, I'm not old, and I don't know so much that I wanted to help people as much as I wanted to change society. I suppose that helping people was a part of that, but I'm an Aquarius, and I just thought that I could promote societal change. The reason I know about Dr. Brewer's Hendrix College in Conway, Arkansas, is because I went to a sort of

sister school called Southwestern University in Georgetown, Texas. People have started to hear about Southwestern because they have started doing research there. When I was a student there were two faculty members in the Psychology Department and that was it. Neither one of them did research so the students didn't do research. That was a real problem. My advisor told me I should go down the road to the University of Texas and take a course in Experimental Psychology if I wanted to go to graduate school. I never did that, but I still got into graduate school. That was thirty years ago. All of the graduate students were doing research and we regularly used undergraduates as assistants in our research. Undergraduate involvement was pretty limited to just being an assistant who helped collect the data. They didn't even get into the informative stages of the experiment; they didn't help with the analysis. They got a footnote in a journal article that got published, but they didn't get an authorship or a conference presentation.

Today, the standard, at least at Colorado State, is that undergraduates should be involved in the informative stages if at all possible, understanding the data, and getting their names on the publication. I think that is probably a really good model. As coordinator of our Applied Social Psychology graduate program, I can assure you that if an undergraduate wants to get into a graduate program other than a PsyD program at a professional school, they really do need to be participating in research. You can have great GRE scores and a great GPA and say that this is really what you want to do, but the competition will be people who maybe don't have quite has high a GPA or GRE, but have actually done what you say that you want to do. They have done research in an area that is of interest to them and they are appreciated if their research skills are a good match to the graduate program that they are trying to get into. Since I have tenure I can say that the one place that you really do not need research experience is a PsyD program at a professional school. However, to get into a PsyD program in a graduate department at a regular university typically requires that you be familiar with research fundamentals and preferably have research experience.

**Cialdini:** My experience with research as an undergrad was interesting in that it led to my first publication and maybe the most prestigious publication of my life in *Science* (Ressler, Cialdini, & Ghoca, 1968). It came as a result of an observation that I made in a laboratory class I was doing. I was doing mostly animal behavior. I was taking a laboratory class in animal behavior and one of our tasks was to classically condition earthworms. And the way we did it was to put earthworms on a Plexiglas plate that had a little motor underneath that would vibrate the plate. We also had a bright light. Now if you know anything about earthworms, they recoil from bright light. So we would turn on the motor, "bzzzzz", the thing would vibrate; then turn on the light and the worm would cringe. It would recoil. Then we would do it again. Vibrate the plate; turn on the light. Vibrate the plate; turn on the light. And then we asked if we just turn on the motor, will it cringe as a result of classical conditioning, like Pavlov's dogs salivated to the sound of the bell? Well my earthworm wasn't working out. It wasn't conditioning. It was a stupid earthworm. It wasn't picking up on the contingency, on the connection, the association. So, I was torturing this thing with this light. Finally, I gave up and I took the worm and put it back in a bucket, and I got a different earthworm. I brought it back to this plate that the previous earthworm had been on, and I put it on there. And you know earthworms are flaccid little spaghetti like things. This earthworm did a summersault in the air and tried to get off of this plate. And I thought, what was that? And it did the same thing again. It literally jumped off the plate. I looked at the plate. And what had happened was that the first earthworm had exuded this white kind of slimy substance. If you have ever put a worm on a hook that's what happens. A white kind of coating that comes off of it. And it was contact with that substance that caused the second earthworm to be so reactive. Well, I called the instructor and explained what had happened; then I said, "Watch this". And the same thing happened; this worm jumped. He looked at it and he said "We've located an alarm pheromone in earthworms that no one knows about. This is a signal that species send to one another to warn them against dangerous settings." They lay down what is essentially a toxic substance to other earthworms who when they touch it, get out of it. It is not that they know to get out of it. They find it aversive. And they find it so aversive that they get out of that setting. Maybe it's where a bird or some predator has stressed another earthworm. They get out of there. So we did a series of studies sending earthworms down tubes and on to plates where we had shocked other earthworms. When they touched it, they continued ahead if it was a control condition without the pheromone. If it was an experimental condition with the pheromone, they turned around and went back in the little Plexiglas tube. That study was published in Science. It was my first publication, and so it was downhill from there!

**Matlin:** I think it's a great way to help students understand whether they want to go in the direction

of psychology, just as some of the people who have been interviewed in *JPI* have noted. I also think it's important because students can say, "Oh, the things we read about in our textbook aren't just something that someone made up. Somebody actually had to design a study, collect the data, interpret the data, write the article, and send it in for review. "Students who have involved themselves in research can understand this process so much more clearly.

## Structuring the Curriculum to Promote Undergraduate Research

**Miller**: We have been looking at placement of our graduates recently and we find that for admission to a PhD program, undergraduate research experience, particularly if it leads to publication of that research in the Psi Chi Journal or other journal is a better predictor of success than GPA. It's not so much that it is a better predictor of getting accepted, but it's a much better predictor of getting support, e.g., fellowships, assistantships, and scholarships.

Why don't we talk about how to structure the undergraduate curriculum so as to promote undergraduate research? When I went to school there was no formal program and it was the occasional student who said I'd like to do this and the professor said ok that will be all right. That would be the minimalist's view of a program. What are some other ways?

**Brewer**: I know how we do it at Furman. We consider undergraduate research as programmatic research. In my Experimental and Statistical Methods course, students conduct a full-fledged research project that involves data collection and analysis as well as reporting the entire project in appropriate APA style and format. For the second project in this course, each student submits a proposal for an experiment of his or her very own. When preparing their proposals, students will have covered analysis of variance and related matters. This proposed experiment is one that students may actually conduct in a later content course, such as Social, Learning, or Memory and Cognition. Faculty members are eager to provide advice and guidance, because these proposals may become students' actual experiments in these advanced content courses. My students often appear in later courses with their proposed projects in their briefcases. Experiments in these courses are often expanded into Independent Research projects for which students receive four hours of credit. So, a productive and diligent undergraduate may get hooked on a particular area of research and produce two or three posters and maybe an oral presentation or two. Students who are especially assiduous may have a publication or two "in press" by the time they get to graduate school. If students develop this kind of programmatic research, they are much more likely to (a) become engaged with the science of psychology and (b) to do something that is truly productive in expanding our knowledge. That's the way we do it, and this approach has served our students very well indeed.

**Wozniak**: How much detail do you expect in that proposal?

**Brewer**: Good proposals are similar to proposals for master's degree theses. They include a review of the pertinent literature and theories, specific hypotheses, design, method, data analysis, and interpretation. These are fairly sophisticated projects for undergraduates.

**Halonen**: I would echo that the developmental nature of what you are doing is important. I think that it is probably also important to add that our approach reflects the context of James Madison University. We have a huge department, 43 people, and the undergraduate contingent is probably 30 or 31 of those. We have adopted the framework of novice to expert so that students in the freshman and sophomore years can have the kind of data collection experiences, similar to what you were talking about, at one level. Then they can join a research team where they can experience greater independence and even then, we really try to assemble teams that cut across programs. We have faculty who are very concentrated on research programs and, based on the number of projects they supervise, they may get course release time.

Our undergraduate director writes a newsletter in which he advertises research opportunities, so students will contact professors about their interests. The culture really drives home the importance of this, and again, this is open to all students not just honor students. Then we also have a group that does just honors work or will do special lab research as their capstone requirement.

We support this in a way that I see happening all over the country, which is to have scholarship days in which you have posters or presentations to give students practice with what the professional side is like. Sometimes that leads to regional or national conferences, and that is pretty exciting. I would share the latest version of our research experiment, which I am really excited about. In the fall, we are going to

have a psychology learning community at JMU. Out of the 500 people that want to be psychology majors in the incoming class, please God don't let them all come, we are going to pull out 25 students who have good math scores, work with them, put them right into a methods class, not an intro class. They will also be taking a college success class where they will be learning specific strategies. We are going to be selecting the community for diversity and creativity. We are anticipating that this will jump-start the number of students who catch fire about research.

**Miller**: Is this a residential community?

**Halonen**: Yep. They will be living together, taking the college success class, the methods class that has statistics integrated first semester, same thing second semester, taught by the same person, who's research is in student achievement and motivation. So that becomes his lab for the kind of research that he's going to do. We are just really excited about what this may be able to do.

**Bell**: We are looking at 1000 psychology majors out of 20,000 undergraduates, which is a relatively large percentage of the campus. We only have about 29 full time faculty, so I'm envious.

**Halonen**: Some days I'd give you a couple.

**Bell**: We'll trade! Our honors program does require Senior theses, so we do get our honors students involved in research early on. Most of them become undergraduate teaching assistants for Frank Vattano in their freshman and sophomore year, and do research right after that. I shudder to think about 1,000 students, many of whom don't have math skills, trying to conduct research. I think that may be a disservice to research. I think that the psych major is such a flexible thing that gets you into so many different kinds of careers that, I'm not sure that getting everyone into research is the right thing professionally. Adjustments should be made for someone who should really not go that way.

**Halonen**: Like helping people?

**Bell**: Yeah, like helping people. Or at least create a placebo for people who want help.
I'm not sure that we should put everyone in research. In our program in the department we have almost 30 faculty, add about 100 graduate students to this, 80 of whom are probably active on campus doing an internship, or other stuff. If you think about 1,000 majors and eighty graduates with 30 faculty, that's more than 10 undergraduates per graduate student, so even if you use a model that pairs up undergraduate students with a graduate student, the numbers make if very difficult to create a quality educational experience. Nevertheless. It is a good model and we have faculty who take about 10 undergraduates per semester and put them on a research team. They meet at least once a week, if not more often, and talk about various projects that they are designing. They talk about things like how to get in the door and get students involved, very much involved, in the data collection, and the write up, and get their names out on publications. Faculty at our institution are rewarded for teaching undergraduate courses and for supervising graduates who are doing the research; few undergraduates are directly supervised in research by faculty. I can tell you this, if we get an applicant for our graduate program and they are from the University of Nebraska at Kearney or Furman, we know the kinds of experiences they have and they will go up in the rankings. There is no question about that. We know what kind of background they have and we know they are going to do well.

**Brewer**: On a much smaller scale, Ithaca College uses research teams. Perhaps Barney Beins will comment on this approach.

**Beins:** It's the ideal curriculum. Our Psychology majors start out with a course in general experimental, which is intro with a two-hour weekly lab. Then they do statistics and research methods, after which they do three semesters of research in a team setting with the same professor. We have each wave of students serve as a mentor to those students coming in for the next semester. A lot of students take the option of doing a fourth and fifth semester on research. So in the end, students have to take eight quantitative or empirical courses as part of their major and it starts with the first semester and works it's way up. Then they can do others if they want. It's marvelous. Students who are marginal in the first semester of research, by the time they get to the third semester are wonderfully confident. Paul, I agree that you don't want to direct them all to research. They can use their skills in other ways when they get out of that.

**Fallshore**: How do you handle transfer students?

**Beins**: Actually, it works out wonderfully. The students come in as freshmen majors since they are usually done with all of their general studies requirements. We have typically three-hour courses, and they need 42 credits for the major. A non-transfer student is typically done with all but about one or two courses by the first semester of their junior year.

They go at it whole-heartedly. If someone comes in his or her junior year, they can take almost all psychology courses and can do it. Even though it's packed, it works very well.

**Buskist:** We have a program at Auburn where students can take one of two courses and get credit for becoming a research assistant. So, whenever I have research that's appropriate at that level, I always solicit undergraduate help. If they do the work that they were "hired" to do, they are always put on as a co-author on the finished product. In fact, I have several publications with undergraduates.

**Appleby:** I teach a capstone class in which my students do three assignments. They write a scholarly paper that traces the history of psychology pioneers and theories and the methods of research. In another assignment they have to create a professional planning portfolio, and I teach this class during the fall of each year, and in the portfolio in which they have to search and discover three graduate programs that would be appropriate. They actually have to fill out the applications for each program, write a personal statement, get three people to sign a paper indicating they will write you a strong letter of recommendation, and lastly, provide me with evidence that they have the necessary skills needed to take the GRE. The third thing they do is a collaborative research project. For the last four years we have been doing collaborative assessment projects. So last year, for example, we had an external review of our department. Although our undergraduate program was reviewed very highly by these people, one of the things they suggested that we do is take the student learning outcomes (SLOs) of our department, and find out where are they being taught in the curriculum. So we did a syllabus audit of all fifteen of my students. Each one of them was assigned to go out and get five syllabi. Then we came up with a set of criteria that would allow each of them to go through the syllabi and identify assignments that hooked up to these SLO's. For example, in what class do you learn how to write in APA style, or develop your oral presentation skills? Where is career related material? Where is that taught? Then we went one step further and did it developmentally with Bloom's Taxonomy. Bloom, an educational psychologist, identified six kinds of skills that you need in order to be fully educated about a topic. For example, you have to be able to remember information about it, but you also have to be able to understand it. As you well know, you can memorize something but not really understand it. Memorizing things lets you answer the "who, when, and where" questions, but it's the why and how questions that require some comprehension. You also have to comprehend something before you can actually apply it to solving a problem. Higher up are things like analysis, where you break a whole into its smaller components and figure out how they fit together: like psychoanalysis—the id, the ego, and the superego. Then there's synthesis, the creative process where you put together things that you hadn't thought were related, into new and creative wholes. Finally, there's evaluation, which is using a standardized set of criteria to judge the actual worth of something. So for example, when evaluating the worth of a psychological test you would use reliability, validity, and standardization as criteria.

## Departmental Resources Needed to Support Undergraduate Research

**Bein**s: The panel has described several different models that all seem to work. Say something about the level of resource commitment on the part of the department. How do you manage that, because it's not cheap?

**Miller**: It's not cheap, that's true. Part of what makes it manageable for us is that we are teaching the labs in our area of interest. In any given semester that we teach a lab, we might have two sections of with 7 or 8 people in it, so we might be teaching 16 students. So we are not engaging 24 to 48 students in research. I don't know how you do that. Still, even for us it's a cost because we do not get rewarded as faculty for that time. In fact, the workload credit we get for labs is less than one for a one-hour lab course. So, yeah, you definitely take it out of your hide.

**Wozniak**: One aspect that makes the task manageable has to do with overlap between teaching and scholarship. The faculty member can reap benefits in terms of developing their own area of research while mentoring undergraduate student research. Out of those labs come not only student publications, but also a number of faculty co-authored publications. In order to do research at an undergraduate institution, the lab courses provide a real advantage.

**Buskist:** Remember that institutions provide opportunities, but it's up to the individual to realize those opportunities. I tell graduate students that whether you go to Harvard or BYU doesn't matter. What matters is that you take advantage of whatever opportunities become available while you are there. I think that American universities provide incredibly powerful opportunities to become educated. And

what I mean by that is that you become a better thinker and better at solving life's problems, whether financial, personal, physical, or psychological. The other thing that I think it means is that you should have developed some sense of humanity and have as one of your life's priority a desire to help others who need it.

## Working with the IRB

**Bell**: I have a question for those who do this intense undergraduate research. At out institution, one of the real crises that we are facing is the IRB. Our human research committee is taking six months sometimes to approve a study that has gotten federal funding provided. Sometimes, for undergraduates, it takes an entire semester to get it through the committee. What do we do?

**Miller**: I'm the director of the IRB at UNK and Bob Rycek is the deputy director of our IRB, and at the University of Nebraska at Lincoln, they did the same thing. They put the head of the IRB in the Psychology Department because it is so labor intensive in psychology, particularly if you are doing undergraduate research. Most of the undergraduate protocols come as exempt by federal guidelines, and we turn them around in a day, not only within our department, but also across the university. The federally funded stuff takes a month. We have never had anything take six months.

**Rycek**: One goal in our department is to have a human subjects committee prior to submission to the IRB. Student research is first reviewed by the faculty member, then by a "gang of four" faculty who comprise our committee and then it is sent to the IRB. The review process within the department takes a few days but then the IRB can approve very quickly and few protocols come back to us for revision, unlike the protocols from some departments whose faculty are less conscientious. In those cases, the process can drag on for several weeks, with most of the time spent in having the student revise the protocol.

**Halonen**: How do you train the faculty who are on this review board?

**Miller**: There is training available on the NIH web site, which is rather good. All our IRB members have gone through that self-paced training. It's all there you just click through, read, and respond. It's a good thing to do. It really gives you guidelines as to how you should treat various kinds of cases. I would recommend that. We also provide a training session for all newly hired faculty. In addition, I have from time to time provided a training session for all of the students in a research methods course, especially for those courses outside of our department.

**Wozniak**: We go through the IRB for the projects in our experimental psychology class. We have our human subject pool coordinator who is an advanced undergraduate student, come in and talk about all of the problems that are tied nicely into the chapter on ethics. So students get trained as well as faculty early on.

**Halonen**: We are about to have an IRB meltdown on our campus because the IRB has defined any data gathering exercise as research. That includes classroom assessment.

**Miller**: There are federal guidelines that say it shouldn't. In fact, the federal guidelines suggest that if you do something in class as an exercise, and it turns into data, that is the only case in which you can file a protocol after the fact. You don't have to file ahead of time for that.

**Halonen**: Well, this is a challenge when you have an IRB chair who has figured out that this is a neat way to build an empire, and bragging about how the turnaround time is really good. We get things back in three weeks. Three weeks! In terms of student projects, that just kills student. It's bad, and that's just part of it. I mean one of the challenges is that this is a person who considers himself to be trained in psychology and goes beyond giving the thumbs up or the thumbs down, he gives advice on methodology, design, spelling, and grammar. So, OK now we know why it is taking three weeks.

**Miller**: It is tempting as an IRB director to give advice on methodology. It's not necessary, although, if you go to the NIH website, one of the things they suggest is don't waste people's time. I sometimes provide methodological suggestions as a postscript. It is not part of the requirement to re-file. It is just "here is a suggestion." We had a protocol recently from the biology department that was examining the effectiveness of St. John's Wort. The researcher was looking at stress reduction. There initial testing, to create a baseline, was planned for the middle of a participant's menstrual cycle. Then they were going to do re-test five weeks later and see whether the depression had lessened after St. John's Wort. I suggested that: "if you are going to test in the middle of a menstrual cycle, you might want to re-test in the middle of a menstrual cycle." They took that advice.

**Bell**: At our institution, if you wanted to do that type of research you would have to have a ten page consent form.

**Miller**: Well, this one was three, given all of the possible side effects. Ever try to get through a school board or state agency? Three months is heaven, sometimes "ever" is heaven. Getting into the public schools, unless you are in an education program and are perhaps teaching at the school already, and you want to do this and you know the principal, it is very difficult. State agencies and public schools have cumbersome approval processes.

## Helping Students to Become Excited About Research

**Halonen**: One of the reasons I asked you, Rick, earlier about whether somebody taught you to be excited or did you learn from experience to be excited is that I do think that has become a kind of paradigm shift that has happened. I see the most successful researchers, the people who do the best teams, are individuals who really help students get past their fear about research, the stage, I love this stage. It's like "all the important stuff has already been found, so how can you possibly ask me to come up with a new idea?" I'm sure that is a predictable developmental stage. I think that a researcher who has the fire can open the door, get them excited that they will be the first person in the universe to have that answer. To have someone say that to an undergraduate, I think would ignite the process.

**Becker**: Given that all of them want to do something regarding schizophrenia or depression, how do you keep that interest and excitement and still try and challenge them to do a research project on ordinary college students. How do you do that?

**Halonen**: Well, you find schizophrenic college students. Seriously, when students come and talk with me about ideas and they propose a grant idea that at least says that they have caught fire, and I want to reinforce that it is great that they have caught fire? I then ask them to just think about some of the practical issues involved. I try to turn it into a problem that they can reason their way through and usually they will come up with, oh yeah, I guess I only have eight weeks left in the semester, and I guess I won't be curing schizophrenia in that time. I think it harkens back to understanding developmentally that it's appropriate for them to come with a huge idea. Then it becomes your job to say, "Great, ok now how might there be a glimmer that would fit into this little window that we've got? Is there something that would work in that little window? Is there something about college students and this population that you are interested in looking at? Is there any way that we can do a simulation?" I think it becomes a mentor's challenge to preserve the excitement within realistic parameters so they aren't completely frustrated.

**Miller**: We use the traditional system at UNK that requires students to take a course in statistics and a course in experimental psychology in their sophomore year. However, our approach to experimental psychology is a little different. Bill Wozniak, for example, often sets up several research projects, that are group projects, but not canned projects. In fact, the projects tend to be cutting edge. It's very risky because he has no idea what the data is going to look like and if the study is going to work. Students get very frustrated when they put in lots of effort and "O gosh, why didn't we find what we thought we were going to find. I thought that was the point. You hypothesize and you have findings that support the hypothesis?" They learn early on about an important aspect of research, that it is not just confirmation of your ideas.

In the junior and senior year, all of our mainstream courses, whether it's memory and cognition, biopsychology, social psychology, or physiological psychology, have an optional lab connected to the course. Students need to take two of these prior to graduation but they are allowed to choose the area depending on their interests. So if they are interested in biopsychology and physiological psychology, those are the two labs they take. In those labs, they will do either an independent or a team research project. Teams usually are limited to two or maybe three people. The actual project and team composition is selected based on interest. So they've gotten the group experience in experimental, and two independent studies in their areas of interest. After that, if they are still interested, and we still have some that are, they'll do an independent study or a lab apprenticeship.

In our lab courses, we will often start out just talking about possibilities without actually designing a study. I try to guide the students to topics in which there are a lot of unanswered questions. It becomes a little more manageable if you start out with the topics that you know have unanswerable questions and there is as available methodology.

**McKeachie:** I think involving undergraduates in research is great. Doing the research and just writing

it up is usually the most popular part of my course. Students get a good kick out of it, and can then see in print what they've done. You know, I still get a kick out of seeing my stuff in print. I think that's very reinforcing, even though I'm not a strong behaviorist. It's not like working for a grade; it's recognition that you did something well, and it gives you a sense that you're worth something; it's self-efficacy.

**Brewer**: I've heard the expressions "catching fire" and "excitement" a lot in our discussion. Let me tell you that I have had very few clever ideas in four decades of teaching, but this is one. On the first day of my Experimental and Statistical Methods course when I talk briefly about their data-collection experiment and their proposals, I take in a stack of reprints from professional journals. The stack is about six inches high. Each reprint has at least one co-author who started out in this very class. I than flip through the stack of reprints and mention the journal in which the article was published, the article's title, and the names of student co-authors who recently graduated or who are still in our program. My present students will recognize certain of these former students and may even know some of the co-authors. Then, I ask in my most excited way: "Which of you will have reprints in this stack three or four years from now?" I answer my own question by saying that I hope every one of the students will have a reprint in my stack for future classes. Knowing certain of these former students who published articles in professional journals, the present students begin to think, "If they can do it, so can I." Students leave that first class meeting a little intimidated but energized beyond belief. They all are thinking about winning a Nobel Prize. You can't imagine what a motivator that first lecture is.

**Buskist:** I think you have to be an interesting person. There has to be something about you as a teacher that draws students to you. It may be because you make class fun and interesting. It may be that you challenge students to think in a way they never have thought before. Or, it may be that you're just friendly and students find you approachable. For any of these reasons, or some combination of them, when it comes time for undergraduates to engage in a research experience they think about you. I think that if you're just up there dispassionately lecturing about psychology, then you won't turn anyone on to psychology. If you really want to have an impact, you've got to let the better aspects of your personality shine through.

**Miller**: One additional point is how to provide ongoing motivation beyond the initial stage. I find that students are usually very excited at the beginning of a project, the idea stage. There are a couple of little points at which faculty need to intervene. One may need to intervene as data collection drags on, and students become frustrated that a number of subjects don't show up for their appointments. You are going to need to be there to sort of re-motivate at that point. The other point is when you complete the project, and you didn't find anything, students react with much more disappointment at that than most faculty members do. Most faculty members are used to that in their research. The trick is to make the null results as exciting as the question was when they started out.

## Rewarding Faculty who Promote Undergraduate Research

**Halonen**: I think that it is important to figure out who the people are who will be the igniters, the ones who love to research, the ones that are publishing, the ones who find that thrill. Next, look at ways to create incentives, perhaps by using re-assigned time. If a faculty member is supervising a research team and the research team is productive, attach something important prestige wise, salary wise, and computer wise, something to it that designates that this is an important value. Yes, that can create some turmoil, but the key is that if you can get departments to agree this is an important goal for undergraduates, and then it is reasonable to take the next step and allocate some of our resources toward that. The challenge, I think, is trying to figure out a system that is equitable. I have some faculty that have seventeen research teams running at one time and others that say they are stressed if they are doing one project.

**Brewer**: I have two quick reactions. First, a commitment to undergraduate research is central to our program, and we don't hire people who do not share this commitment. Over a period of years, then, we get a cadre of people who join your faculty because they want to conduct collaborative research with undergraduates. Second, Furman has a banking system whereby faculty members get teaching credit for supervising students' projects in a formal course called Independent Research. For example, after I supervise four such projects in whatever period of time, I get my teaching load reduced by one four-hour course. We believe that supervising four Independent Research projects is about as demanding in time and effort as is teaching one four-hour course.

**Miller**: I don't think any of my faculty are involved in undergraduate research for financial reasons. But, the university did set up a way of recognizing and

rewarding people involved with undergraduate research. We have a research-mentoring award. We have a student research day in about three weeks that will involve 300 student poster presentations across all disciplines. In a way it is an accumulation. Some of these will be presenting posters based on papers that they have read at a conference earlier in the year. Others perhaps will only present here. At that time, a faculty member from each undergraduate college will be recognized with the mentor award, which includes money, a certificate, and a handshake from our Vice Chancellor for Academic Affairs. It's a model that some might want to take back to their school as a way of saying that undergraduate research is important it's worth promoting and worth rewarding.

## Showcasing Undergraduate Student Research

**Anderson:** I think that a critical part of students doing research is communicating it. That is very important. They can discover that research is a community effort, that science is a community of people thinking about things in different ways and transmitting their ideas and findings to others. Students can go to undergraduate research conferences to present their work. That is the best part—that is the icing on the cake! The students come out of it, and they are just so high. They see themselves differently. They feel so great about what they did. They are so happy. They are so pleased. They see their research as something a little bit more valuable than they had before. They know that this research is not fabulous or earth shattering, but they have nearly all come out of the experience of presenting their work feeling quite good about their products and their role. I have a requirement now in my classes that students must present their research. We just got the letter that Julie Stopulos' manuscript (Stopulos, 2004) was accepted for publication in *JPI*, which was quite an arduous process. I am really impressed at the reviewers' comments, and I want them to keep up those standards. Julie sent me all "yippee" emails. She was just so happy, and I told other students at Ambrose, and they were all excited for her! Some said, "We want to do that, too!" That excitement is very important. I think that presentations and publications are an absolutely critical element in the research process. I even appeal to the sense of their resumes. Build your resumes even if you never go into psychology. Students are able to have a product of their own that they stand behind and can survive!

**Buskist:** Undergraduates can enter the scholarly arena in several different ways, and I think one of the best ways is through the programs that Psi Chi promotes—its conferences and its undergraduate research journal and through the *Journal of Psychological Inquiry*. These opportunities provide a supportive, nurturing experience for students. If you start playing with the big dogs too soon, and you don't have thick enough skin, you're going to be completely discouraged. These folks can be nasty, even heartless, sometimes. We don't need to expose undergraduates to that. We don't even need to expose some assistant professors to that.

**Ware:** How about handling those rejections or even the necessity for revision? Students, for example, can be very discouraged by getting back a review that says, "More work is needed." How about yourself?

**McKeachie:** Well sure, it's frustrating, especially if it's a research proposal, and it's pretty good. Personally, I sometimes think that the reviewers didn't understand at all what was important, but most of the time the suggestions are good, and if it's outright rejected then there's always another journal. Usually, if it's rejected, I think sure, this isn't earth shaking. Most of the things I publish aren't earth shaking. I think some people would be interested, so I'll send it to a journal that doesn't have such strict standards. You find a lot of publications that--if you just stuck to the really important journals--probably wouldn't get published at all.

**Rycek**: In addition to the regional conferences that Psi Chi supports, we have a series of undergraduate research conferences that are really good avenues for undergraduates to get to see what other undergraduates are doing, for instance, the Great Plains Students' Psychology Convention.

**Miller**: One of the differences between that kind of a conference and a regional conference is that at some of the student conferences, the presentations are judged. At the Great Plains convention, there will be at least two faculty members in the back filling out a sheet that provides the presenter with feedback about what was good and what could be improved. There are also awards given in each session. The best paper and the second best paper from that session will get a certificate. So there is immediate recognition. Students have that, and the feedback, which is very valuable. Thus, someone other than the faculty advisor will have read or listened to the students' presentation and provided useful suggestions.

**Beins:** I tried to count the number of undergraduate research conferences in psychology. I know I missed quite a few, but I counted more than 25, and that does not include local university events.

**Brewer**: Allow me to add one final point about conferences. Furman students seem to be reassured by the label "student research conferences." Knowing that all presenters will be students makes such conferences a lot less threatening, even though Furman students are not easily threatened. Student research conferences can be a good warm-up for a professional conference at the regional or national level. Hence, your students may benefit from presenting first at a conference for their peers.

## The Benefits of Undergraduate Research

**Appleby:** You basically just have to make them aware of the advantages of becoming involved in research. I think most undergraduates, before they understand how important it is to do research, just think it's something difficult and time consuming, Why not just get your degree as soon as possible? It helps if you can make them aware of the fact that ~~the~~ person with whom they do research is going to be able to write them a very strong letter of recommendation. Another thing is that research actually helps, and you don't just wake up and do research. You have to have a reason to do it; you have to have some sort of a question. Then it becomes a really interesting process, where you can investigate something that you're very interested in. So, it's got some external rewards to it, it's got some internal rewards to it, and just simply learning the process of doing research is going to make you a more critical thinker, rather than just a memorizer and a responder. It's going to make you evaluate, etc. Those are the three things that I try to impress upon my students. And when they learn how important it is, then they start trying to figure out, "how can I get involved, where can I do this, how can I do this?" I act as a "people broker" in my department and I pay close attention to what my students are good at and what my colleagues are looking for. And I try to match them up and things like that.

**Cialdini**: I think it's very valuable even for those undergraduates who don't go on to graduate study in psychology. In my presentation earlier at this conference, I was lamenting the extent to which the people in the Keep America Beautiful organization and the Petrified Forest administration, to whom I was showing our experimental results, were not willing to take the counsel of those data but were instead responding to another form of data, which was essentially self-report. They weren't getting the vital difference between self-reports on the one hand and a controlled experiment on the other. The more undergraduates that we can infuse with a recognition of the distinction between simply asking people what is going on and testing what is going on in a controlled fashion, the better off the society is in general. So, I am a great advocate of expanding the message of psychological science beyond the graduate level community in which we frequently work.

**Buskist:** I think the most important advantage is not about the research but about the faculty member becoming more aware of how undergraduates function. Not every faculty member is going to be sensitive to what undergraduates do because, quite frankly, a lot of faculty will turn an undergraduate over to a graduate student to supervise and never again see him or her. What I like to do is involve the undergraduates in all the lab meetings and conversations and let them know that I expect them to pitch in and contribute to the project. That helps me to get a feel for where their head is and it gives me an opportunity to tune in to what undergraduates are thinking so that I am able to relate to them a little better. A second advantage is that it introduces them to the scholarly aspects of academia, and I think that's the best way to get introduced to scholarship. They get their hands a little dirty and the longer those students stay with you, the dirtier they get their hands, the more they like it, and the more influence you can have on them.

**Anderson:** Whether they appear to have potential to do original research or not, I think there's room in the research process for everybody to be involved and to learn something. One thing you learn doing research is that you can't do it by yourself. Well, maybe you could, but it would be lonely, and it would be frustrating. I think it would be awfully difficult to do it well. So you need many people and people are at different levels. If someone wants to code data or collate the questionnaires, that would be great. Last year some students were coding their data and discovered that one of their questionnaires was missing a page. Fortunately, we had collected enough data on other issues that we could still address some interesting issues. But the students were disappointed. If we had someone coordinating the stimulus materials, it would have been a tremendous help. Following receipt of tenure, I said my plan for the next five years was to get students actively involved in research and for them to be models for one another. At St. Ambrose, I teach four classes each semester, which is a lot of class work. I really don't have time to have my own ongoing research. I also don't have the facilities. So what I try to do is get students involved in research in a variety of different ways. I'm still experimenting with all the

different approaches. Some approaches have been more successful than others, and sometimes it depends on the semester, the student, and the topic. I try to get students involved in research and try to do it in a visible way. I make it very clear in the classes, sometimes even the intro classes. But sometimes I have to push a bit, and I say, "Come on guys." Once they get into the process, a few students describe it as a considerable amount of work and never want to do it again. I think it is important to learn what you don't like; you learn something about yourself. For example, when I got involved in clinical research as an undergraduate I realized that I didn't want to do that. I think that was really important for me and probably for any potential clients that I might have had. You have to find yourself. But when exposed to the research process, some students really show great initiative, drive, promise, and skills. Those people I push a lot harder and try to get other students in on their projects. At past research conferences, I've found that a majority of the research fits very clearly into the area of social psychology and much of the other research is very closely related or relevant to social psych. Social psychology covers much ground, and it works well with undergraduates, although I usually let my students' interest drive the research topic. If they pick something that I'm totally clueless about, I let them know. If they really want to do it, I'll do my best to learn about that topic. Usually students pick topics that are interesting to me, and it's a nice opportunity to learn something new. Their interest really drives much of what I do.

**Brewer:** Appropriate undergraduate research is an integral facet of education in psychology. Learning how to do good research is like learning how to drive a car. You can read every book that has ever been published on how to drive a car, but you don't learn to drive a car until you drive a car. Similarly, you can read all the books on research methods and statistical analysis, but you learn how to do research when you do research. I discovered early in my career that the research you do is very different from research reports in published articles, and I try to convey this difference to my students. Research that you read about sounds sterile. Most articles are written in the same format. Readers get the impression that researchers simply go through the lock-step procedures from one step to the next to the next, and so on. Authors seldom tell readers how many times their procedure failed and they had to start over, or that they lost all their data in a computer crash. Until you conduct research, you don't understand what research entails, because you will not get the full story by reading published articles in psychology journals. Research is just not like that. One person (Ithink it was Joe McGuigan in his textbook titled *Experimental Psychology: Methods of Research*) said that doing research does not involve the ties, tails, and evening gowns that you read about in journals; instead, doing research is more like dirty blue jeans and sneakers. That is a good way to highlight the difference.

**Suinn:** There are a variety of benefits for continuing to involve undergraduates in research activities. One, there's a benefit for the faculty. The faculty get the benefit of seeing a question pursued for which the faculty want a scientific answer, and you can't always do that yourself. So that's a benefit for the faculty. The faculty get the benefit of seeing one of their students engaged in a real challenge and standing back and saying, "Look! I've laid the foundation for you. Now let's see what you can accomplish." Two, from the student's perspective, there are some payoffs. The student, as I said earlier, becomes a peer with the faculty person, because now you are working together. And you also have the satisfaction of going through a series of questions, designing something, finding out the answer, and experiencing the satisfaction of saying "I did that in a systematic fashion." Even if the research doesn't lead to a final answer, it might lead you to a new direction. Three, for the discipline of psychology, [research with undergraduates] may bring a new perspective. Having looked at an issue of the Journal of Psychological Inquiry, I read an interesting article by an undergraduate about whether the first impression of a faculty person is a lasting impression despite negative data to the contrary [see Cooper, Bott, & Wallace, 1999]. I think that's an interesting question that someone else might never have raised. So, for psychology as a discipline, undergraduates doing research can provide a different perspective and, therefore, new information and new conclusions. Finally, there is a benefit for society. Because you do the research and learn the scientific method, you acquire more sophisticated thinking skills. As you become members of your neighborhood, or society, or community, you are now a better person in that environment.

# Section 1. Institutionalizing Undergraduate Research

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# Facing the Crisis in the Academy: Creating a Culture of Undergraduate Research in Contemporary Institutions of Higher Education

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## Traditions and Current Problems

Since Boston Public Latin School was established in 1635, the needs of society have dictated areas of emphasis in American institutions of higher education (Boyer, 1994). In colonial times, the academy's main purpose was to train clergy, civic leaders, cobblers, mechanics, tailors, and other trade skills necessary for community viability and growth. Following the American Revolution, the main task of higher education was to build a nation, figuratively and literally. Poly-technical institutes with specialization training in engineering and construction began to emerge as early as 1824. In 1862, Congress passed the Morrill Land-Grant Act linking higher education to the agricultural and mechanical needs of the developing nation. From World War II through the Korean Conflict, the nation's universities partnered with the federal government to enhance national security and advance our technical know-how. Following successful Soviet space flights in the mid-1950's, colleges and universities broadened their emphasis on the sciences. The 1960's brought civic unrest and the civil rights movement. Interest shifted to the social sciences and other disciplines that sought answers to difficult social problems. Throughout modern history, the story of America and an emphasis on higher learning have been inseparably locked; until recently.

Boyer, in his 1994 *Chronicle of Higher Education* article, Creating the New American College, identifies a growing disconnect between the practical needs of the nation, and the *credentialing* of students through passive learning practices and the self-preserving activities of the professoriate. In his opening statements, he asked, "How can American higher education successfully contribute to national renewal? Is it possible for the work of the academy to relate more effectively to our most pressing social, economic, and civic problems?" (p. A48). Unfortunately, according to many, in its current state the answer to this question is most likely a resounding "NO." There are some who speculate that American higher education is in a state of crisis (e.g., Lucas, 1998).

Colby, Ehrlich, Beaumont, and Stevens (2003) echo Boyer and others who write about the modern-day academy, "As American higher education has evolved from the eighteenth century to the present, moral and civic concerns have moved from its center, inherent in the very concept of a college education, to its margins, segregated from the rest of academic life" (p. 25). All too often projects and activities that produce tangible benefits to those outside the hallowed halls of academe are not evaluated as *scholarly* by institution-based reviewers. Those professors who chose to take their knowledge to the people in practical and applied ways may be putting their academic careers in jeopardy. Boyer (1994) and The Boyer Commission (1998) call for major reform in American colleges and universities, with a return to the responsive service-oriented institution where what a student is learning can be applied in immediate and effective ways to make a difference in the world. They are not alone in their pleas.

As institutions of higher learning have evolved from *uni*versities whose primary role and mission has traditionally been to impart treasured knowledge to those who earnestly seek it, to the *multi*versity (Kerr, 1963) with many different stakeholders and increased demands for accountability from the public sector and legislative *bean counters,* many voices have arisen calling for critical examination of the status quo and reform into a more responsive system. Books such as *Crisis in the Academy* (Lucas, 1998), *The Future of Higher Education* (Newman, Couturier, and Scurry, 2004), *The Responsive University* (Tierney, 1998), *Universities as if Students Mattered* (Scanzoni, 2005) and *Who's in Charge of America's Research Universities* (Tighe, 2003) are but a handful of the volumes calling for large-scale reform and revision of the undergraduate curriculum. Benitez (1993) explains that there are

multiple problems with the nature and style of teaching in many modern institutions of higher education. He laments,

There is too much rote learning, meaningless content, ineffective methodology, and goals that aim at the wrong target. Content is learned for its own sake rather than as a means to think and inquire. Few connections are made between what is taught and what is important to the student, and consequently, the material remains foreign and devoid of meaning. (p. 100).

Scanzoni (2005) asserts that most undergraduate instruction follows what he refers to as the *teaching paradigm* rooted in theological ideals; one simply listens to the clergy expound in a foreign language and then, on cue, gives the appropriate response with little or no indication that learning has occurred. This is more colloquially known as the *sit and git* or the *jug and mug* style of education, where instructors pour information from the proverbial jug into the waiting and passively expectant mug of the students. Professors lecture, while students ingest and then regurgitate by rote. Critics of this type of education are numerous and have complained for decades. Hamilton Holt, President of Rollins College in 1931, once stated, "Lecture is the mysterious process by means of which the contents of the professor's notebooks are transferred by means of a fountain pen to the pages of the student's notebook without passing through the mind of either." This has not always been the case in high education.

## Traditions of Applied Learning in Higher Education

Early practices and philosophies in American education emphasized practical applicability, mentoring relationships, and engaged learning experiences through both formal and informal systems. Throughout the ages, master craftsmen and artisans have trained apprentices working under their direction and learning their craft. Rites of passage included demonstration of the skills and abilities sufficient to warrant independent functioning. Scanzoni (2005) asserts that applied mentoring was a main staple in less formal systems of education as well. He noted that historically, boys learned how to farm, hunt, and fight through their associations with adult role models. Girls, on the other hand, learned about child rearing, food preparation, and gardening watching and working along side female mentors. The concept of mentorship and experiential learning has also long been a staple of more formalized education as well. Drawing from the works of John Dewey, Len Vygotsky, Kurt Lewin, David Kold, Jean Piaget, and others, many educators have utilized mentoring relationships and experiential learning activities to augment undergraduate student learning and address civic and community needs. In reviewing reports by The Boyer Commission and others, Scanzoni (2005) concluded that in order to better prepare students for modern day demands, institutions must use instructional models patterned after a *learning paradigm* rather than the aforementioned and currently popular teaching paradigm. Within this learning paradigm students, to be successful, must demonstrate that they actually possesses the *human capital* skills (the capacity to analyze, evaluate, synthesize, and thereby demonstrate problem solving skills) which signify a quality education. As was routinely practiced in earlier times, engaged learning experiences and mentorship with faculty are central to this pedagogical approach. How, when, and why have we moved from these traditions to the current state of affairs?

## How did we arrive at our current state?

Tighe (2003) has identified several issues in higher education that have contributed to many of the problems cited above. He notes that institutions are increasingly accountable to external stakeholders who may or may not be familiar with the demands and expectations of faculty at a college or university. These stakeholders may be putting more pressure on faculty in some institutions to *publish or perish* and to obtain extramural funding for their own research programs or to justify their positions. This has created an environment in which devoting time to mentoring, teaching, and supervising undergraduates may actually be detrimental to the career path of the university professor. Currently, many faculty members function as private entrepreneurs rather than as members of a faculty. Their devotion is to their discipline and others interested in the same type of research that they are doing (cooperative interest or competitive interest), reducing their identification with the institution and their willingness to devote precious time, energy, and attention to undergraduates. To save money and other resources, universities are relying more and more on part time or adjunct faculty to teach classes. These adjuncts often have conflicts of interest with other part-time or full-time work places, leaving the needs of students and the institution lower in their list of priorities. Other factors seem to be involved as well.

Referencing climate change due to the greenhouse effect and global warming, Schoppmeyer (1993) argues that the "climate of higher education is being disturbed by what might be termed 'the dog

house' effect" (p. 129). He finds that the control and standards of higher education are "less the property of faculty and more the property of assorted administrators" (p. 129). He believes problems with rank and tenure processes that value publication records over teaching excellence and service to students and the academy constitute a hallmark change in the culture of higher education over the past few decades. He speculates that much of the research conducted within this set of expectations is "carried on largely to satisfy the administrator who never even reads it" (p. 135). Indeed, a large proportion of scientific findings are published in journal articles that draw limited readership, and most of those who are reading these journals are also doing research work in the same area, thereby reducing the general interest of published material.

Lucas (1998) argues that unchecked growth in the number and sizes of institutions of higher education has contributed to the problem. He states in the introduction to his book *Crisis in the Academy* that if there is a *crisis* in American higher education today, it is "chiefly a crisis of purpose within the university" (p. *iv*). He suggests that overbuilding and over investing in higher education, and the construction of a system of mass postsecondary education that is widely available with low admissions standards have produced a type of higher education whose success has been a mixed at best. Lucas also points out that despite tremendous growth, "the tacit goal (of higher education) always is to preserve the status quo, or, failing that, to modify it as little as possible" (p. *xii*). Once a teaching paradigm is adopted to help support a mass influx of undergraduate students, this mode of education becomes a solidly established norm.

## What is the impact of these "problems"?

Regardless of the origins of these *problems*, undergraduate students in the American system of higher education deserve better instruction than they are currently receiving. Although many schools profess to nourish higher-order capabilities such as critical thinking, reasoning, working cooperatively, writing clearly, and mastering other forms of communication in their mission and vision statements for undergraduate education, they seldom genuinely achieve these aspirations. The learning paradigm methods that most likely lead students toward achieving these lofty goals are not always reflected in institutional artifacts, policies, and practices. Many outside of the academy are taking note of this alarming trend. Scanzoni (2005) cited a recent gubernatorial address to the schools in the state system of Virginia that included a simple question about graduates from institutions of higher education. "Do the degrees they receive confirm that they are proficient writers, critical thinkers, and ethical citizens? That is, after all, what you contracted to provide" (p. 126). He presumed the Governor's answer to the rhetorical question was "No". The teaching paradigm has chronically left students unmotivated and lacking a passion for learning. The traditional lecture followed by exam format has proven ineffective and inefficient at producing life long learning. As Scanzoni (2005) poignantly puts it, "after upchucking its contents, the vessel is empty" (p. 158).

Some also speculate that corporate America is currently demanding more from their new hires than the current system of higher education provides. R. Crosby Kemper, Chairman of the United Missouri Bank and Sam Walton's personal banker recently stated, "We don't want people who are trained for specific jobs coming out of the college system. We want people who can read and write, who are literate, who are numerate, who have some sense of engagement with the world." (Cited in Scanzoni, 2005, p. 239). Mr. Kemper and others have made no mention of rote memorization, passively listening to lectures, or getting good marks on multiple choice tests as requisite for their new hires. Fortunately, many have offered suggestions and recommendations to address these new requirements.

## Proposed Solutions

### *The Boyer Commission*

The Boyer Commission on Educating Undergraduates, formed in 1995 and funded through the Carnegie Foundation for the Advancement of Teaching, conducted a comprehensive study of research universities in the USA. Their 1998 work, *Reinventing undergraduate education: A blueprint for America's research universities,* also noted that American Research Universities are in a crisis state and that our treatment of undergraduates need be "reinvented through radical reconstruction and implementation of a synergistic system where undergraduate students enter a world of discovery in which they are active participants, not passive receivers" and "collaborative learning experiences provide alternative means to share in the learning experiences…" (p. 9). They promote the idea of creating "student-centered research universities" in which faculty and students are learners and researchers, and whose collaborations and

"interactions make for a healthy and flourishing intellectual atmosphere" (p. 9). They relate that while undergraduate tuition dollars typically fund a large part of the financial support for research programs and graduate education, undergraduate students often get less educational attention than they deserve given the social contract they enter into when they enroll in an American institution of higher learning. The report calls for a new model of undergraduate education that reflects a more symbiotic relationship among all participants in university settings. It also contains some specific ideas for change.

The Boyer Commission (1998) made ten process-oriented recommendations for change in higher education. These recommendations apply across disciplines and across a wide variety of institutions, especially those that are categorized as research universities. The first and most pressing recommendation: "*Make research-based learning the standard*" (p. 15). Citing the work of John Dewey, the commission noted that "learning is based on discovery guided by mentoring rather than on the transmission of information" (p. 15). Involving undergraduates in research projects has multiple benefits. The commission continues, "Inherent in inquiry-based learning is an element of reciprocity: faculty can learn from students as students learn from faculty" (p. 15). If, as is presumed, faculty teaching is enhanced by their own research endeavors, why not expect that student learning might also be enhanced by being a part of a research team. The Commission notes that profound changes in the way undergraduate teaching occurs are necessary. They comment that "traditional lecturing and note-taking, certified by periodic examinations was created for a time when books were scarce and costly; lecturing to large audiences of students was an efficient means of creating several compendia of learning where only one existed before" (p. 16). This teaching paradigm delivery system persisted in to the present largely because it was "familiar, easy, and required no imagination" (p. 16). Placing the type of emphasis on undergraduate research the commission recommends, would "turn the prevailing undergraduate culture of receivers in to a culture of inquirers, a culture in which faculty, graduate students, and undergraduates share an adventure of discovery" (p. 16). The remaining nine Commission recommendations are directly or thematically related to this primary finding.

For example, the Commission recommended that each student should experience an inquiry-based freshman year along with a discovery-based capstone experience. All ten recommendations were designed to help students receive a firm grounding in inquiry-based learning and assistance in transitioning from the passive teaching paradigm they experienced in public K-12 education. To support these changes, the commission also recommend that universities change faculty reward systems to validate efforts to support these activities, and to recognize faculty who engage in these types of efforts. Many in the field have voiced similar opinions (e.g., Benitez, 1993; Lucas, 1998).

Scanzoni (2005) joins this group of reformers and calls for more research opportunities for undergraduates as a means to remain competitive in a global market economy. He notes that as more technical jobs are outsourced to India and other countries where labor is readily available and overhead is much less expensive, American businesses will look for those who are creative thinkers, architects in their field. Students/graduates who can create novel solutions to solve current problems and to anticipate solutions to new problems as they arise will be in high demand. To be competitive in the global market, students will need to development "*Human Capital Skills* (analysis, evaluation, and synthesis)*"* (p. 4). He refers to the form of education most likely to produce this type of learning and preparation as *discovery-based learning* and that collaborative research with undergraduates epitomize activities that are discovery-based. "Any type of research is, by its very nature, *learning* based on some sort of active inquiry, exploration, or investigation. Hence, by connecting undergraduates to action research we are, at one fell swoop, involving them in discovery-based learning" (p. xii). He asserts that through engaging undergraduates in discovery-based research projects we are better preparing them to meet the demands of the job market and addressing the needs of society.

## Implementing Solutions by Changing Institutional Culture

And who will be responsible for implementing these changes? Adminstration? The public? Legislators? Students? All of these parties will certainly have some influence on the future direction of curricular-based matters. However, faculty are ultimately responsible for initiating and sustaining these types of adjustments. Tighe (2003) notes, "Whether the faculty are paying enough attention to the curriculum and whether the curriculum is meeting the expectations of society may be questioned, but what is not questioned is that we (faculty) must look to the faculty to define the curriculum" (p. 54) (Parens mine). Although the Provost and Dean may give broad recommendations for curricular

adjustments, core decisions typically rest with the academic department, which is managed by a department head or department chair who, in most situations, has been appointed or endorsed by faculty members themselves. However, recent trends that lead faculty to be more devoted to their discipline than to their institution, have left the door open for central administration, or required central administration to make major decisions regarding the direction and mission of the university. This translates directly to adjustments in curricula. Tighe also argues that universities are increasingly asked to tune their programs to the social and economic interests of their communities, however, faculty are becoming largely preoccupied with their professional interests and detaching themselves from the governance decisions these additional demands place upon the institution. He noted, "Universities are facing difficult dilemmas that are unlikely to be constructively resolved unless faculty take greater responsibility for the welfare of their institutions and contribute what they can contribute" (p. 66). While faculty are not fully responsible for providing conclusive solutions to the problems facing American Universities today, these problems should be squarely faced with full engagement of the faculty.

Psychology faculty are well prepared to take the lead in creating this new learning environment. Scanzoni (2005) not only views the social sciences as a rich proving ground for these types of changes, but also identifies an obligation for faculty members to facilitate them. Rather than pigeonholing faculty as entrepeneurs or credentialers, the *new college* might invite faculty to consider being coaches: teacher-scholars who cultivate students' curiosities and stimulate them to undertake meaningful discovery-based learning. Bringing about such a transition requires slow and sustained change in what is valued, in what is communicated in an overt and in a covert manner, and in what is reinforced systematically. I am speaking of the need for faculty to work along with staff, administration, legislative bodies, and students to create changes in which a culture of undergraduate research and discovery-based learning becomes the norm in our colleges and universities. Psychology departments are a natural place for this type of cultural transition to occur.

## Culture in Higher Education

Culture, according to Raymond Williams (1976), is "one of the two or three most complicated words in the English language". He continues to explain, "It has come to be used for important concepts in several distinct intellectual disciplines and in several distinct systems of thought." (pp. 76-77). Examining *culture* specific to institutions of higher education is even more difficult (Chidsey, 1939). While there are numerous resources available that focus on management strategies designed to help organizations and businesses better understand and then make desired changes in their cultures, relatively little information specific to higher education exists. However, just as in organizational settings, the culture of institutions of higher education dictates what is valued, embraced, and sought after; what drives the social contracts, rewards, and punishments; and what lends to the institution's stability and a sense of community (Wagener, 1993). Artifacts, values, norms, and assumptions (Keyton, 2005) reflect a university's culture just as they do in a multi-billion dollar corporation. However, some cultural idiosyncrasies are specific to higher education and convolute the picture even more.

Most likely what a university possesses is a *multiple cultural configuration* Alvesson (2002). Within any university cultures overlap across disciplines, departments, areas of specialization, colleges, etc. making it difficult to precisely define the culture of that particular institution. Van Patten (1993a) noted that higher education in general has a culture; however, there are no single models for explaining or understanding what that culture is. Another complicating factor is that the culture of higher education has seemingly been forced to change very rapidly in the last 20 years or so making it more difficult to fully understand. The recent business model in education has created new demands on institutions of higher education that were seldom seen in earlier times. External stakeholders demand measures of output and productivity even as levels of bureaucracy have increased. Lucas (1998), reviewing the nature of American colleges and universities over the last 50 years, discusses the proliferation of administrators while the relative growth of the professoriate has been somewhat flat. These are but a few ways the culture of higher education in our country has been changing.

Finding ways to meet these new demands while maintaining or even improving the quality of our undergraduate education has created a reactive set of cultural changes within departments, colleges, institutions, and systems of higher education. Many are dissatisfied with the current direction these reactive changes have produced. Van Patten (1993b) argues that, "We can no longer do business as usual. Systematic efforts should be made…to assure a positive, healthy, organizational climate" (p. 80). He identifies efforts made to market more aggressively, to adapt new recruiting strategies, to augment student services, and to play to "legislative perceptions of the most effective utilization of resources and social

priorities" (p. 80) as imperative for future decades of higher education. Growing dissatisfaction with the current direction of higher education, especially undergraduate education, suggests a zeitgeist currently exists that could facilitate more planned and deliberate cultural change.

Given the paucity of available information on changing culture within higher education, a great deal can be gleaned from the organizational literature and applied to the college or university setting. An organization's culture is what sets it apart from its competitors. Consumers often decide which fast food restaurant they patronize not so much for the quality (or lack thereof) of the food, but rather for the environment, customer service, and other amenities (playgrounds, etc.) available. Similarly, organizational culture overtly or tacitly influences choices between banks, grocery stores, and home improvement suppliers, all of which have similar product lines. Establishing a favorable culture could be a distinguishing factor for a college or university and a deciding factor in student (consumer) choice. Being able to cultivate a culture of learning in higher education that satisfies faculty, staff, administrators, students, and other external stakeholders may be of benefit to many institutions. To ensure its survival, higher education must become more sensitive to and dedicated to meeting the needs relevant to our day and time. I believe that incorporating a learning paradigm and involving undergraduates in discovery-based learning moves in this direction. As educators, we must change our culture; but how?

## Changing Culture in Higher Education

Cultural change is inevitable; whether it is dramatic revolutionary change a la Kuhn, or slow progressive evolutionary change a la Darwin, change happens. Directing the type of culture change that occurs requires active intervention on the part of those whom the change most directly affects. Addressing needed adjustments in higher education, Tierney (1998) argues that "instead of a managerial fix that seeks to reform this or that part of the organization…fundamental change needs to occur" (p. 3). He continues, "Change ought not to come from around the edges, but rather go to some of our core activities." (p. 3). He recommends a complete realignment of what is valued and what is practiced at the grass roots level.

Recent models of culture change in higher education have begun to emerge. Educational consultants, administrators, and faculty have implemented various programs designed to produce lasting change in the nature and quality (culture) of higher education. These change programs have included PPBS (Planning, Programming, and Budgeting Systems), MBO (Management by Objectives), TQM (Total Quality Management), and Strategic Planning, among others. Each has addressed specific types of problems, but has largely fallen short of solving the larger demands of complex academic institutions. As Keyton (2005) and Alvesson (2002) observe, culture change programs imposed by higher management often fall short and fail to garner widespread support. Chaffee (1998), Van Patten (1993b), and others call for a more thoughtful reconsideration of quality management philosophies in which a *customer focus* might be what higher education needs in the long run. However, to be effective these change models must be faculty driven, student oriented, and management supported. According to the organizational management literature, this teamwork approach is more powerful and more effective than mandating cultural change from the top down (Alvesson, 2002). Developing a culture in which meeting customer needs is a priority may address many of the problems inherent in modern-day higher education discussed above.

Of course, moving toward a customer service culture requires that many issues first be addressed. Initially we must ask "Who are our *customers*?" Students, potential students, employers in the region, graduate schools, people in the region who benefit from university programs, public citizens whose tax dollars support public institutions, elected representatives, and others are all potential customers of colleges or universities. Research universities have even more complex sets of *customers*. Chaffee (1998) explains that serving people requires two essential ingredients: a service, and someone who wants or needs the service. Knowing and understanding what our customers want will place us at an advantage.

Caring for our customers is critical in a Total Quality Management approach. Establishing a culture in which some of our customers (employers) benefit from new hires (students/graduates) with practical skills and hands on abilities and other customers (legislators) recognize a higher end tax base in return for their investment. This mutually beneficial scenario has the potential to pay large dividends for our institutions of higher learning. Showing students (customers) that learning can be an enlightening, challenging, rewarding, and fun endeavor inspires life long learning, benefits the public good, and may have a positive influence on alumni donations back to the institution. Incorporating undergraduate research and a discovery-based learning mentality into the culture of an institution can be one avenue toward this end. But

how to facilitate this type of cultural movement is the question.

A *golden rule* for changing culture is stamina (Alvesson, 2002). The idea that quick fixes provide long-term solutions to age-old problems is unrealistic. However, stability sufficient to institutionalize a new culture is becoming increasingly rare. In corporate America, as in our institutions of higher education, promotions from within are becoming the exception rather than the rule. Administrators whose ideas and strategies are successful are sought after and recruited to other places, often for a higher salary than their current company or institution is willing and/or able to pay. Faculty members also seek out opportunities in other institutions that offer more opportunities for advancement or better salary. Long-term projects that cultivate a culture of undergraduate research at an institution must have a broad base to be stable and functional. Multiple faculty and administrators with the same vision facilitate the process. In other words, if the proposed change is the pet idea of just a few individuals the movement will likely fade if they should relocate or retire. Successful efforts seek to institutionalize the new culture at all levels; national, regional, university wide, departmental, and course specific.

Some institutions may wish to follow The Boyer Commission's recommendations (1998) and become more student-centered by emphasizing discovery-based learning through undergraduate research. Creating this type of culture in our institutions of higher education will require stamina, energy, commitment, sacrifice, and creativity from many different sources. Students, faculty, staff, administrators, and external stakeholders are all needed to create the norms, values, and assumptions supportive of this new culture. In this book, we examine successful culture change at various institutions across North America. We include examples from a wide variety of perspectives. We examine national and regional university models, departmental models, models for undergraduate research in individual classes, as well as examples of extramural activities and events that perpetuate and support this type of culture. We hear from faculty and students about their individual roles in creating and sustaining this organizational change. Since financial support is necessary for any type of sustained change, we also have included reports from those who have become expert at seeking, receiving, and disseminating funding for undergraduate research and discovery-based learning. Doing research for its own sake is a noble purpose; however, disseminating the findings to larger audiences adds a sense of realism to the project and serves the needs of the larger community. We hear how dissemination of research findings has become an institutionalized part of undergraduate research culture. As with any program for improvement, no conclusions can be drawn about success or failure without the appropriate assessments. The last section of the book examines several assessment efforts and their findings.

We hope the following examples of undergraduate research cultures that have grown and prospered in various institutions across the country will provide inspiration, a springboard of ideas, rather than proscriptive recipes to be followed. No one approach will work for every institution; however, taken together, the chapters that follow can serve as a framework upon which to build the values, norms, assumptions, and ultimately the practices that promote a new culture in undergraduate education: a culture that better serves our *customers* than many current practices do.

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# Lessons from the CUR Institutes on Institutionalizing Undergraduate Research

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Beginning in 1996, the Council on Undergraduate Research (CUR) began offering weekend-long workshops called CUR Institutes that bring together faculty and administrators interesting in probing issues related to undergraduate research. The longest running version of these Institutes is one entitled *Institutionalizing Undergraduate Research*; thirteen Institutes had been offered by the end of 2007. As coordinators or facilitators at all but one of these Institutes, we have interacted with over 150 colleges and universities that have attended, and we believe that we can reasonably describe many of the lessons that institutions have derived from the workshops. We also should point out that we have engaged in follow-up visits to many of these attending institutions, so our relationships have extended over longer periods of time, and these visits allowed us to reflect further on the outcomes of the Institutes.

In this piece we will describe the Institutes along with the benefits and challenges that institutions in attendance have discussed. We realize that all institutions are idiosyncratic and not all of the issues described here will be applicable to local institutional conditions; however, we will try to encapsulate enough issues to include those that are important to many different kinds of colleges and universities.

## Background on the Institutes

Each institute is structured as an intensive two and one-half day workshop that begins on a Friday night and extends through mid-day on Sunday. Two general activities are interwoven throughout the weekend: plenary sessions where the facilitators, coordinators and invited speakers give presentations, and break-out sessions where the teams work with their facilitators drafting goals and plans for their individual campuses. In designing the programs for each session, the coordinators attempt to accomplish two objectives. First, during the plenary talks, background information on topics relevant to undergraduate research assists participants in identifying the issues they may want to consider during the weekend. Topics for these talks vary and have included: models of undergraduate research programs, the impact of undergraduate research on student learning, examples of successful undergraduate research programs, assessment of research activities, inclusion of underrepresented groups, the role of grants and contracts offices, collaborative and community-based research, research in the humanities and social sciences and funding opportunities for research.

The second, and perhaps the most important weekend activity, involves campus teams developing mission statements and establishing a series of goals for undergraduate research on their individual campuses. The culmination of each Institute is a summary presentation of team goals and plans that is delivered as a final project to all the attendees. This public presentation gives teams an opportunity to test out their ideas, to prioritize their goals, and to extract ideas from other teams that might be beneficial to their own campus.

Each Institute has involved between 11 and 16 teams, with each team typically consisting of three to five members. Using an application process, the coordinators solicit background information about the composition of each team and their reasons for attending. The most common motivations for attendance revolve around an interest in broadening campus research activities from isolated pockets currently present to an integrated campus-wide effort. Other institutions lack even pockets of faculty research and are interested in starting a research effort from ground zero. As part of the Institute structure, coordinators match schools with similar interests and backgrounds to a common facilitator so that teams will have the opportunity to learn from other participants, as well as from the facilitators and speakers.

We believe the composition of campus teams, especially the individual disciplines of the members, is critical to the success of the developed campus initiative. As such, the most successful teams are

those with broad campus representation from many different departments. In addition, we strongly encourage each team to include department chairs and an administrator, preferably one with oversight responsibilities in some aspect of undergraduate research. This person most commonly has been a Dean, Provost/VPAA or grants officer. Because the composition of the team is absolutely critical to the success of the campus initiative, institutions should exercise considerable care in selecting team members for the Institutes. Team members must have credibility with their campus colleagues, and at some level, they must have the ability to help foster campus change. We also expect that each team member contribute to answering a set of self-study questions. In this manner, the goals generated at the Institute have a realistic chance of being received positively by the campus community after the teams return to their home institutions.

## Preparation for the Institutes

We have found that for teams to be successful, members must come to the Institute having completed their surveys and groundwork. The Institute should not be the starting point of the process, but rather should serve as a catalyst to help move issues forward on campus. One of the most useful pre-Institute activities is the construction of an inventory relating to existing campus activities associated with undergraduate research. This inventory may be performed by the Institute team, which is a typical situation, or by others on campus, such as a research committee. In either case, this activity is a very useful campus mechanism to draw attention to the topic. The most common outcome of the survey is the realization that numerous pockets of undergraduate research exist at many localities on campus, and that in some cases the activity is substantial. However, the total campus community is generally unaware of this broad participation.

Prior to attending the Institute, we ask teams to generate a list of attainable goals for the weekend and to enumerate the positive features of their campuses related to research, along with the challenges or impediments to their possible research goals. No doubt, much of the support needed to enhance undergraduate research across institutions involves time and resources. For example, all faculty members agree that the reduction of teaching loads/assignments would allow for additional time to engage in research activities. However, we have found that regardless of the teaching load, a reasonable match between an institution's tenure and promotion expectations and the teaching load/opportunities is most important. A significant campus problem arises when a mismatch occurs between research output requirements (for retention, tenure or promotion) and the time available to do the work. As an example, for some schools a nine unit per semester teaching load might be quite reasonable while for other institutions with higher research expectations, this may be an unrealistic teaching load. As a word of caution however, faculty should be careful what they request--a reduction of teaching loads almost always occurs with additional administrative expectations for output and productivity. This results in a higher level of pressure on the faculty.

One of the common reasons campus teams attend the Institutes, as relayed by the attendees, is that an administrator, commonly the VPAA or Provost, wants to broaden campus participation beyond isolated pockets of research. Frequently the administrator wants to institutionalize the research activities and points to the science areas of the campus for a how to example. However, one must be careful about trying to import a science model of research into the humanities and other disciplines. We encourage institutions to judge the merits of research based on their own disciplinary models.

Fundamental to the work at the Institute are the choices that teams need to make regarding the structure of their individual campus activities. As an example, teams need to contemplate the merits of a departmental-based model whereby individual departments serve as the focus of the program versus a campus-wide program whereby an office of undergraduate research oversees the activities. We have seen successful examples of both models, but prefer the campus-wide model since the centralization of activities allows the faculty members additional time to focus on their major duties, teaching and research, rather than on administration.

## Outcomes from the Institutes

So what are the characteristics of a campus team with successful post-Institute outcomes? First, the campus must have the capacity and desire for change rather than the inclination to remain comfortable with its current state of affairs. Campus change can proceed in many ways, however, specific choices are very individualized and beyond the scope of this paper. What we do know is that a campus ripe for transformation has strong campus leaders who believe in these efforts and who have the power and sustainability to bring about the intended transformation. These leaders may be

administrators, but in the initial phases of campus efforts we have more commonly found a faculty champion most effective in keeping the fire burning brightly. This grassroots approach seems to garner more support from the faculty, although at some point in time those leaders with the ability to move and/or reallocate resources must join the project.

Naturally, having strong campus leadership goes hand-in-hand with a thoughtful and viable plan that can move forward in a reasonable time frame. At the heart of the Institute is the construction of individualized short-term and long-term goals that will help institutionalize the campus undergraduate research program. These campus plans must include a list of goals, time lines for implementing the goals, a list of individuals responsible for each goal, and the assessment plan (with time lines) for each goal. We have found that responsible individuals or offices must be identified and associated with each goal. As an example, stating that the "institution will sponsor workshops focusing on undergraduate research" is insufficient. Rather, teams must specify the necessary timelines, and individuals responsible for establishing contacts and presenting the workshops. Without this level of planning and specificity, the plan is little more than a notion and most likely will never be implemented.

From our perspective, the most successful institutional teams are those that methodically complete the campus plan follow-up once they return to their home institutions. We speculate that many strategic plans are gathering the dust of non-use on virtually all faculty bookshelves. Although most teams find the weekend Institutes to be psychologically invigorating, returning to their home institutions and initiating substantial campus change is a great challenge. If follow-up is an essential key for success, it becomes clear that campus advocates must be committed for the long term. There will be many peaks and valleys in the implementation of campus plans, but it is clear from the literature, and from our experiences, that the quality of the campus leadership is the single most important factor in generating substantial institutional change.

All institutions experience common obstacles to creating a robust campus research ethos. Typical issues include faculty resistance to undertaking more scholarship, lack of resources and compensation, rank and tenure issues, differing cultures between departments, teaching loads and motivational issues for faculty, students and administrators.

Attendees frequently ask us to speculate on standard campus norms for the allocation of scarce resources – what must an institution allocate to sustain a successful campus-wide undergraduate research program? Our typical answer is that many individual campus factors enter into the equation, and therefore a single solution is not applicable to all institutions. This answer does not please most attendees, for they want a specific dollar amount to use as ammunition upon returning home; however, the individual teams must realize that institutions vary significantly. We certainly can list characteristics of institutions with successful, established programs. While not all these attributes are found at all institutions, the list does give a good sense of what institutions may want to consider if interested in a comparison with successful undergraduate research programs:

- Programs mesh with institutional/departmental goals.
- Programs are started by interested faculty who also sustain them (at least initially).
- The administration supports programs physically, psychologically and monetarily.
- Undergraduate research is included in strategic planning documents—at all levels.
- Travel funds are available for faculty and students.
- Teaching credit is provided for research with undergraduates.
- A student research symposium and/or a campus publication of research results exists.
- A program of early research sabbaticals is in place.
- Institutional monies are available for summer stipends for faculty and students.
- The Undergraduate Research Program is campus-wide.
- There is a research-rich and flexible curriculum.
- Faculty and administrators support teaching and scholarship.
- Support is available for writing grants and contracts.
- Student-faculty research is recognized in rank and tenure decisions.
- Faculty who are research active are publicly recognized.
- Matching funds for external grants are provided.
- Adequate space and equipment is available.
- Students are recognized for their research accomplishments.
- The campus support staff, for example the Business Office, is supportive.

On an individual faculty level, new faculty in the sciences often receive start-up packages totaling from $20,000 to $200,000, with approximately

$75,000 considered to be reasonably competitive with the highly research-active undergraduate institutions. New faculty members frequently receive an initial reduced teaching load, extra travel funds and summer stipends for themselves and for their research students.

## Conclusions

Ample evidence shows that CUR Institutes have been successful, and institutions have derived considerable benefits from attending. Less clear are the long-term overall benefits for research in US colleges and universities. Although each Institute strives to assist individual institutions to work towards their goals and aspirations, the overarching goal of the Institutes is to help change the landscape of higher education so that faculty research with undergraduates becomes the norm rather than the exception. We cannot yet tell if we have made substantial progress towards this goal, but we are optimistic that movement has occurred. For example, although undergraduate research has a relatively long history in the natural and physical sciences where it is quite natural for collaborative work to occur, in other disciplines collaboration is not the norm. However, we have seen the disciplinary backgrounds of the attendees at the Institute change quite dramatically over the years so that faculty members from the social sciences, humanities, business and education now comprise a majority of the attendees. This shift has led CUR to offer Institutes specific to those in the social sciences/humanities as one way to reach out to this large cadre of faculty who tend to have less experience with undergraduate research as a means of enhancing student learning.

CUR recently received a $500,000 multi-year grant from the National Science Foundation to offer new Institutes with a regional focus as a mechanism to build research communities in various regions of the country. Central to these efforts are enhanced follow-up activities with longer-term relationships developed between CUR and the institutions in attendance, and amongst participating institutions. We will offer these NSF-sponsored Institutes for the first time in the fall of 2007.

We have found that successful teams typically leave the Institutes with at least two major accomplishments. First, they go home with a well thought out plan and one that has gone through a reality check by other participants at the Institute. The teams should be confident they are on the right track for success and are part of a national effort that has validity, and an exciting future, and is one in which they would like to participate. Second, the successful teams go home energized by the discussions and engagement with the other participants and their facilitator. Good teams must have considered how this energy will be sustained once they return to campus; institutionalizing these efforts and substantially changing the campus culture is a great challenge.

Many institutions have reported positive outcomes from attendance at these Institutes. However, we should not minimize the challenges of changing the culture of any institution, especially around an issue as inflammatory as the level and type of research expected from the faculty. As we have described, the challenges are many; however, the benefits are substantial if an institution takes on undergraduate research as a method of enhancing faculty lives and student learning. We remain confident that a fundamental paradigm shift is occurring at institutions across the nation.

# Promoting Undergraduate Research: Institutional Support Mechanisms

**John Falconer**

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Undergraduate students have been involved in original research for generations, dating at least to the middle of the 19th century when Yale, Williams, and Johns Hopkins began using scientific laboratories and the prospect of discovery to recruit and engage students. But institutional efforts to integrate independent scholarly work into the undergraduate experience are a relatively new phenomenon—with notable exceptions such as the College of Wooster's fifty year old Independent Study program. The founding of the Council on Undergraduate Research in 1978, the first National Conference on Undergraduate Research in 1987, and the publication of the Boyer Commission Report on Reinventing Undergraduate Education in 1998 served as benchmarks in the growing awareness that undergraduate education is enriched by original inquiry and collaborative work with members of an academic faculty.

At the individual or departmental level, faculty members develop and conduct meaningful undergraduate scholarly experiences regardless of what is happening across campus, but organizational theory suggests that an alignment of goals and resources within a university is essential to purposeful development. If a college or university wants to support and increase student research, several components of the institutional structure can be configured to support student research. This chapter presents a survey of campus-level mechanisms that support student research at various colleges and universities in the United States.

## The Broader Research Enterprise

Student research often flows from the scholarly work of faculty, and an active faculty culture of scholarship is a powerful building block for student research. Thus, the mechanisms that support faculty scholarship are important to student research as well. For example, offices of sponsored programs and research (grants offices) aid faculty in the pursuit of extramural funding to support research. Faculty members who have just completed doctoral programs at research intensive universities sometimes bring an expectation that undergraduate students are not prepared to work on high level research, and therefore do not consider this option. Grants offices can often introduce the idea of student participation in research. Funding agencies understand that undergraduate students—properly prepared—can make significant contributions to research programs while developing their own capacities for engaging in independent scholarship. Two critical issues for research proposals that include undergraduate students are to have reasonable effort expectations (students have classes and other activities competing for their time) and to have specific activities described so that reviewers will be able to assess the reasonableness of the plan.

Grants offices can also support student research by steering faculty toward specific funding opportunities designed for smaller programs or that support student research. For example, the National Institutes of Health have a cross cutting AREA program (Academic Research Enhancement Award) that is intended "to stimulate research in educational institutions that … have not been major recipients of NIH support" (http://grants.nih.gov/grants/guide/pa-files/PA-06-042.html). Likewise, the National Science Foundation (NSF) has a cross cutting RUI Program (Research in Undergraduate Institutions) that provides support for researchers at primarily undergraduate institutions (those awarding fewer than 10 PhD or DSC degrees per year). The RUI program funds specific research proposals, shared use equipment acquisition, and collaboration with NSF funded researchers at other institutions. NSF also has a Research Experience for Undergraduate program (REU) that supports faculty-student collaborative summer research programs.

Other funding programs also support undergraduate research, such as the NCUR/Lancy Program (ncur.org/lancy.htm), the Howard Hughes Medical Institute (www.hhmi.org/grants/institutions), and the U.S. Department of Education McNair Scholars Program which prepares undergraduates for future doctoral study.

Some sponsored programs offices also support departmental efforts to build grant-seeking skills among students through activities such as presenting mini-workshops to class sections, where the process and principles of grantwriting can be covered. While these efforts at outreach will rarely lead to new extramural funding for the institution, they can be an important part of departmental efforts to build research skills among undergraduate students.

Institutional Review Boards are a second administrative function fundamental to the research enterprise. Known as IRBs, these committees are formed to ensure the protection of human research subjects. Research protocols that gather data from or about living people must be approved by an IRB, whether the research is conducted by faculty or students. This means that students—particularly those in psychology, exercise science, and sociology—frequently encounter IRBs if they are conducting research.

As with any regulatory body, IRBs can improve interaction with their constituencies through effective outreach and education. This includes informing the campus about policies (what types of projects need review), conducting information sessions that prepare investigators for submitting protocols to the IRB, and explaining the review process. These outreach efforts should target students as well as faculty, including speaking to class sections where appropriate. In response to federal policy, many campuses are requiring investigators to undergo training before conducting human subjects research, which challenges IRBs to determine when and how to conduct training for student researchers. The training should not be onerous, but still provide the researcher with knowledge and a framework for protecting research subjects.

A final element of aligning IRBs with student research is to include a student on the board. This provides the student with direct experience in reviewing protocols, as well as access to the committee discussion and related policy issues. A collateral benefit is that other board members come to understand the student perspective. As with sponsored programs, IRBs are created to support faculty research but they can also be an important and positive part of a culture that develops young researchers at the undergraduate level.

Many institutions of varying sizes are home to research centers that provide a vehicle for interdisciplinary research. Examples include the Center for Environmental Affairs at Middlebury and the Materials Science Center at the University of Wisconsin - Eau Claire. While such centers are typically organized to facilitate faculty research, they offer a good opportunity for engaging undergraduates in interdisciplinary research.

## Student Research Mechanisms

Colleges and universities have a range of mechanisms dedicated specifically to undergraduate scholarly activity. Administratively, the models vary from a committee—such as the Undergraduate Research Council at the University of Nebraska at Kearney—to an administrative position such as the Associate Dean for Undergraduate Research at Middlebury College. Some institutions create a position to direct an office of undergraduate research, while others incorporate undergraduate research into the portfolio of an existing dean.

In each case, the intention is to make student research a part of the institution's undergraduate experience by dedicating a position to developing opportunities for students to engage in original scholarly activity. The most appropriate model for a particular institution depends on the responsibilities and resources that will be invested: How much personnel time is to be dedicated? Is this a strategic position, or an administrative support office? What functions will be performed by the committee or office? Campus level programs range from the free to the expensive. Some examples are offered below.

## Student Research Celebrations

One of the best ways to encourage student scholarly activity is to celebrate and recognize the good work that is being done across campus. An annual event can be as easy as setting up a large room with tables or easels. This type of forum allows students who conducted original work—from high profile programs to off-the-radar collaborations with faculty—to present their work on research posters like those displayed at professional scientific meetings. Except for poster printing, this can be a very low cost event. Institutions can enhance the event with prizes for the best posters, a luncheon for presenters and their mentors, and concurrent sessions for oral presentations and fine arts performances. Some institutions cancel classes to boost attendance.

## Undergraduate Research Journals

A second mechanism for celebrating student research is to publish a journal of student papers. Such publications are often open to all disciplines, and submissions are reviewed by faculty members. Once accepted, a faculty or student editor may proof the copy, and then on-campus or for-profit printers can print and bind the journal. These publications

become effective marketing items that can be sent to on-campus and off-campus constituencies.

## Student Research Grants

While many institutions provide internal support for faculty research through competitive grants, a second channel for undergraduates to apply for small grants is increasingly common. Students receive operating support for their projects, as well as the experience of developing a competitive proposal. Funds can cover lab supplies, survey materials and postage, travel, and other costs associated with project implementation. Students receiving grants can be required to present their work at student research celebrations to ensure dissemination.

## Research Interns and Fellows

To engage lower division students in research as soon as possible, some institutions offer stipends on a competitive basis to students who participate in research programs. At the University of Wisconsin – Eau Claire, *research apprentices* receive a small stipend to work alongside upper division student researchers. This provides exposure to the culture, expectations, and excitement of research, which helps prepare students for taking on their own research as they develop. At Utah State University, incoming freshman can be awarded *research fellowships* which carry a stipend and an opportunity to work closely with faculty on research projects.

## Summer Research Programs

The NCUR/Lancy Initiative and other efforts to increase multidisciplinary student research have led to the development of Summer Undergraduate Research Experiences (SUREs) or Summer Student Research Programs (SSRPs). These programs differ from more traditional research grants by complementing faculty-student collaborative research with broader developmental activities. SUREs may involve 10-20 or more students each summer, forming a community of scholars who challenge and support each other. Stipends of $3000 or more enable students to dedicate a significant portion of their time to research in the summer. Weekly meetings provide a forum for discussing cross-disciplinary issues like ethics, leadership, and graduate school, or more specific topics for students working together on an interdisciplinary project. Stipends for students and faculty, operating budgets, and travel money can make SUREs expensive, but they can also become the centerpiece of an institution's student research offerings.

## Faculty Mentor Awards

As with any organizational objective, institutions must send appropriate signals to faculty about what is valued on campus. One way to do this is to give recognition to individuals who stand out as exceptional in certain areas. The University of New Mexico and the University of Nevada Reno are but two examples of institutions that give Undergraduate Research Faculty Mentor awards. Typically, winners are announced at annual student research celebrations, and may receive cash awards up to $2000. Such awards express to the faculty that the long hours they invest in student scholars are noticed and appreciated by the institution.

## Institutional Commitment

While many of the institutional programs that support undergraduate research and scholarship are low cost, others can be very expensive. Examples include summer multidisciplinary research programs (stipends for 10 students alone can top $30,000) and sending students to NCUR ($600 or more per student). In times of declining state funding, expenditures at this level can be difficult to support. The University of Nebraska at Kearney developed permanent support for a summer undergraduate research program during a system-wide prioritization process. Students also approved a student fee that includes up to $70,000 per year to support activities such as student dissemination of scholarly works. At the University of Wisconsin Eau Claire, the UW Board of Regents established The Center of Excellence for Faculty and Undergraduate Student Research Collaboration in 1988. A differential tuition measure directs over $1 million to enhance student experiences, including faculty-student collaborative research and scholarly activity.

Undergraduates have been involved in independent inquiry since perhaps the beginnings of higher education. Four year colleges and comprehensive universities have found that in a tightening market of higher education, they can define a competitive niche by becoming particularly good at offering undergraduate students opportunities to apply their knowledge and develop academic skills through independent scholarly activities. The activities described above appear in different forms at institutions around the country, and can be adapted in whole or in part at colleges and universities seeking to enrich their climate of student research and scholarly activity.

# External Support for Undergraduate Research


## Vincent Prohaska

***Lehman College, City University of New York***


First the bad news: External funding to support undergraduate research is scarce. The good news: Quality undergraduate research in psychology can be done on very small or even *illusory* budgets (Collins, 2002). More good news: Takooshian, Velayo, and Prohaska (2002) found over 11,000 instances of institutions providing money for their own undergraduates to use to do research. Generally the amount of this support was small, but there is no reason to ignore it. It can include money for research supplies, duplicating costs for questionnaires, food for animals, payments for human participants, money to go to conferences to present the work, and sometimes even stipends. At institutions that do not have such funding available, it simply might be the case that no one has asked or made the case for it. Psychology is well ahead of the curve in involving undergraduates in real research. Institutions with development offices that are accustomed to fund-raising might find donors interested and willing to give money for this specific purpose. Donors often like opportunities to support undergraduates directly, and research support is a really excellent opportunity a development office could offer donors. A number of the internal sources that Takoosian, et al. identified carried donors' names on them.

The even better news: External support, although scarce, does exist for all components of the undergraduate research experience. One of the largest sources of support is Psi Chi, the National Honor Society in Psychology. At present, Psi Chi offers over $250,000 per year in a variety of programs supporting its members and their research. However, this support is limited to members, who join Psi Chi through chapters at their institutions. For institutions that do not have a Psi Chi chapter, information on establishing one can be found at www.psichi.org.

## Full Academic Year Support

The *Research in Undergraduate Institutions* (RUI) program, under the National Science Foundation (NSF), funds both individual and collaborative research projects undertaken by faculty at predominantly undergraduate institutions. The goal is not specifically to support undergraduate student research, but to support research at undergraduate institutions. Often undergraduate institutions might not already have a research culture or the type of curriculum and laboratories that train undergraduates to do quality research. In such cases, an additional NSF program might be of assistance. The *Course, Curriculum, and Laboratory Improvement* (CCLI) program focuses on improving the research skills of undergraduate students by focusing on educational and facilities improvements. Information on these and other NSF programs can be found at www.nsf.gov/funding/browse_all_funding.jsp.

For federally designated minority serving institutions (e.g., HBCU's - Historically Black Colleges and Universities; Hispanic Serving Institutions, Tribal Colleges), several institutional grant programs will support undergraduate researchers during the academic year, such as the *Minority Access to Research Careers* program (MARC) under the National Institutes of Heath (NIH) and the *McNair* program under the Department of Education. For eligible institutions, local grants offices should have information on the availability of these and other federal programs.

## Summer Research Programs

Most summer research programs fund undergraduates to spend an intensive 8-10 week period over the summer concentrating on research, either at their home institutions or away at research-intensive institutions. Perhaps the most well known and extensive of these is the *Research Experiences for Undergraduates* Program (REU) of the National Science Foundation (NSF). This program extends to all of the sciences, not just psychology. Each year approximately 20-25 institutions are selected to participate. These institutions accept applications directly from undergraduates who want to spend the summer doing research with the institution's faculty. Selected undergraduates, usually approximately 10-12 per school, receive stipends from NSF to cover their expenses (food, housing, travel), and may also receive additional funds from the host institutions. Information on applying to serve as a REU host site: www.nsf.gov/funding/browse_all_funding.jsp.

To find current sites for student placements, go to www.nsf.gov/home/crssprgm/reu/reu_search.cfm. Psychology sites are listed in two areas: Social, Behavioral and Economic Research, and Biological Sciences.

The Council on Undergraduate Research (CUR), with funding from the American Psychological Foundation (APF) of the American Psychological Association (APA) offers a summer research fellowship. The fellowship includes a student stipend plus funds that may be used for travel, faculty honorarium, and equipment expenses. The application is completed by the faculty mentor, who must be a member of CUR. The application can be found at www.cur.org/apffellowship.html.

Psi Chi offers 14 *Psi Chi Summer Research Grants* of $5000 each: $3500 for a student stipend and $1500 to the sponsoring faculty member. One of the goals of this program is to support undergraduates from non research-intensive institutions who wish to spend the summer working at a research intensive institution. However, going to a different institution is not a requirement; undergraduates can receive one of these grants to conduct research at their home institution. The deadline for applications is March 30. More information can be found on the website: www.psichi.org/awards/completelist_awards.asp.

Psi Chi also has teamed up with the Association for Psychological Science (APS) to offer six *Psi Chi-APS Summer Research Grants* to allow students to conduct summer research with members of APS. The amount of each award is the same as the *Psi Chi Summer Research Grants* described earlier. More information can be found at the website: www.psichi.org/awards/completelist_awards.asp.

## Support for Direct Costs of Research

Two external sources accept undergraduate applications for funds to support the direct costs of their research projects. Psi Chi offers a *SuperLab Research Grant* that provides SuperLab software and a response pad. Psi Chi also offers *Undergraduate Research Grants* of up to $1500 each. At least 30 Undergraduate Research Grants can be awarded each year. These funds can be used for such costs as equipment (although requests for general permanent items such as computers, printers, etc., are rarely funded), supplies, laboratory animals, and travel to research sites. A nice feature of these grants is that there are two deadlines, November 1 and February 1, so that undergraduates can actually get the money while they are still doing the research, rather than waiting to be reimbursed afterwards. Student applicants must be members of Psi Chi. Information and applications can be found at this website: www.psichi.org/awards/completelist_awards.asp.

Sigma Xi, The Scientific Research Society, also offers a *Grants-in-Aid of Research* Program. Grants of up to $1000 can be awarded (up to $2500 for vision related research). Deadlines are October 15 and March 15 of each year, so here too undergraduates can get the money while they are conducting the research. Membership in Sigma Xi is not required. However, 75% of the funding is restricted to student members or projects on which a faculty member is the advisor. More information is at www.sigmaxi.org/programs/giar/index.shtml.

For Psi Chi faculty advisors, there are *Faculty Advisor Research Grants*. As many as 12 grants of up to $2000 each can be funded each year. These grants can be used for direct costs, as well as to pay undergraduate research assistants. The deadline is June 1 and information can be found at :www.psichi.org/awards/completelist_awards.asp.

## Awards for Completed Projects

Psi Chi offers a number of awards for completed undergraduate research projects. Every undergraduate member who, as first author, submits research for presentation at the Psi Chi sessions at regional or national meetings is eligible for one of these awards. The number of *Regional Research Awards* varies by region, depending, in part, on the number of submissions. There also are up to eight undergraduate *National Research Awards* given for submissions to be presented at the American Psychological Association (APA) and Association for Psychological Science (APS) conferences (4 awards at each conference). Both the regional and national research awards consist of a certificate and a check for $300. There also are Psi Chi awards for completed research projects and papers. The *Erlbaum Award in Cognitive Science* of $500 can be awarded each year for the best empirical research in cognitive science. Three *Guilford Undergraduate Research Awards* of $1000, $650, and $350 can be awarded each year for the best undergraduate papers. Three *Allyn & Bacon Psychology Awards* of $1000, $650, and $350 can be awarded each year for the best undergraduate empirical papers.

## Closing Note

Please notice the phrasing of the last sentences in the preceding paragraph: “can be awarded each year.” In too many years there are simply not enough submissions for all of the Psi Chi awards to be awarded. In fact, in most years Psi Chi does not

spend the full amounts budgeted for many of its programs. So, for faculty who think "Psi Chi gets so many applications my students don't have a chance," please change that mind-set and encourage undergraduates with excellent research ideas or completed projects to submit. Even if the competition for some grants is strong, students with excellent projects should still be urged to apply. Nothing is quite as effective in convincing an organization that a grant program is valuable and deserves more funding than large numbers of fundable proposals.

If funding is not critically needed for a project, achieving an external funding award raises student self-esteem, contributes to an institution's prestige (which media relations and development offices tend to love), and allows local resources to be stretched farther. Although external funding for undergraduate research may be scarce, there is no reason good research should go undone for lack of funding.

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# Research Ethics: Issues and Resources

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The knowledge gained through psychological research has provided many practical benefits as well as invaluable insights into the causes of human behavior. Despite these benefits and insights, the process of conducting scientific research can pose serious ethical dilemmas. Because research is a complex process, well-intentioned investigators, especially students with only limited experience, can inadvertently overlook the interests of research participants, causing harm to the participants, scientists, science, and society. This chapter outlines some of the issues that the student researcher and his or her mentor need to keep in mind when conducting research, and describes online training programs available for teaching research ethics.

## Ethical Issues in Recruiting Participants

One of the first ethical issues a researcher must address is the recruitment of research participants. In the recruitment process, researchers must be guided by the principles of autonomy, respect for persons, and the principle of beneficence that requires them to minimize the possible harm to participants while maximizing the benefits from the research (Scott-Jones, 2000). The first stage in the recruitment of participants is often an advertisement for the research project. At this stage, ethical concerns include the use of inducements and coercion, consent and alternatives to consent, institutional approval of access to participants, and rules related to using student subject pools. Researchers must not exploit potential participants, especially vulnerable participants, by offering inducements that are difficult to refuse, for example highly desirable toys to children. At the same time, researchers must weigh the costs to the participant and provide adequate compensation for the time they spend in the research process.

Most psychological research is conducted with students recruited from university subject pools, which raises an ethical concern since the students' grades may be linked with participation (Leak, 1981). Ethical practice requires that students be given a reasonable alternative to participation that offers the same credit as those who choose to participate in research. The alternatives offered must not be seen by students as either punitive or more stringent than research participation.

## Informed Consent and Debriefing

Informed consent is the cornerstone of ethical research. Consent can be thought of as a contract in which the participant agrees to tolerate experimental procedures that may include boredom, deception, and discomfort for the good of science, while the researcher guarantees the safety and well-being of the participant. In all but minimal risk research, informed consent is a formal process whereby the experimenter presents the relevant aspects of the research along with the obligations and responsibilities of both the participant and the researcher. Minimal risk refers to a level of harm or discomfort no greater than that which the participant might expect to experience in daily life. Research that poses minimal risk to the participant is allowed greater flexibility with regard to informed consent, the use of deception, and other ethically questionable procedures.

Informed consent presents difficulties when the potential participants are children, the participants speak a different language than the experimenter, or the research is therapeutic but the participants are unable to provide informed consent. Certain research methodologies make it difficult to obtain informed consent, as when the methodology includes disguised observation or other covert methods. The omission of informed consent in covert studies can be appropriate, when there is a need to protect participants from nervousness, apprehension, and in some cases criminal prosecution (Herrera, 1999). While most psychological research includes an informed consent process, federal guidelines permit informed consent to be waived if (a) the research involves no more than minimal risk to the participants, (b) the waiver will not adversely affect the rights and welfare of the participants, and (c) the research could not be feasibly conducted if informed consent were required.

## The Use of Deception in Research

At one time deception was routine in behavioral science research, and by the 1960s research participants, usually college students, expected deception and as a result sometimes produced results different from those obtained with unsuspecting participants (Diener & Crandall, 1978). In general, psychologists use deception in order to prevent participants from learning the true purpose of the study, which might in turn affect their behavior. Many forms of deception exist, including the use of an experimental confederate posing as another participant, providing false feedback to participants, presenting two related studies as unrelated, and giving incorrect information regarding stimulus. The acceptability of deception remains controversial, although the practice is common.

Several alternatives to using deception are available. Role-playing and simulation can be used in lieu of deception (Geller, 1982). In field research, many researchers have sought to develop reciprocal relationships with their participants in order to promote acceptance of occasional deception. Such reciprocal relationships can provide direct benefits to the participants as a result of the research process. In cases where deception is unavoidable, the method of assumed consent can be used. In this approach, a sample taken from the same pool as the potential participants receives a complete description of the proposed study, including all aspects of the deception, and indicates whether they would be willing to participate in the study. A benchmark of 95 percent agreement allows the researcher to proceed with the deception manipulation.

## Avoiding Harm: Pain and Suffering

Participants' consent is typically somewhat uninformed in order to obtain valid results untainted by knowledge of the researcher's hypothesis and expectations. Because of this lack of full disclosure, the researcher must ensure that no harm will come to the participant in the research process. Protection from harm is a foundational issue in research ethics. The researcher must consider physical harm; psychological stress; feelings of having ones' dignity, self-esteem, or self-efficacy compromised; or becoming the subject of legal action. Other types of potential harm include economic harm, including the imposition of financial costs to the participants, and social harms that involve negative effects on a person's interactions or relationships with others. In addition to considering the potential harm that may accrue to the research participant, the experimenter must consider the possibility of harm to the participants' family, friends, social group, and society.

While conducting research, the researcher's responsibility includes monitoring actual or potential harm to the participant in case the level of harm changes during the course of the research. One cause of change in potential harm is a mistake made by the researcher. If the likelihood of harm increases, the researcher should inform the participant and remind him or her that voluntary withdrawal without penalty is available (Eyde, 2000).

A particular kind of harm addressed in the 1992 APA Code of Ethics is the harm caused by culturally incompetent researchers whose perceptions of gender and race are misinformed by their group's view of social reality (Casas & San Miquel, 1993). Research designs constructed by researchers with uninformed views can reinforce negative stereotypes about the group studied. One way to avoid this ethical bias is to view research participants as partners as opposed to subjects in the research process. The perception of partnership can be fostered by taking the participants into the researchers' confidence, providing a thorough debriefing and the opportunity for further involvement in a role other than *subject*.

While psychological research into certain processes, for example anxiety, depends on the arousal of some discomfort in the participant, the researcher must look for ways to minimize this discomfort. In many situations, discomfort is inherent in what is being studied. When nothing can be done to eliminate this type of discomfort, some ways that may minimize the psychological consequences of the discomfort include providing full and candid disclosure of the experimental procedures, providing opportunities for the participant to withdraw, and ensuring that there are no lingering ill effects.

## Maintaining Confidentiality

Respecting the privacy of the research participant involves much more than just obtaining informed consent. Confidentiality is a complex, multifaceted issue. Confidentiality involves an agreement, implicit as well as explicit, between the researcher and the participant regarding disclosure of information about the participant and how the participant's data will be handled and transmitted. The participant has the right to decide what information will be disclosed, to whom it will be disclosed, under what circumstances it will be disclosed, and when it will be disclosed.

Participants must be informed about mandatory reporting requirements, for example, illegal activity, plans for sharing information about the participant

with others, and the extent to which confidentiality can be legally protected (NBAC, 2001). Review committees are responsible for ensuring that the proposed research procedures will not unintentionally compromise confidentiality, especially if participants are vulnerable because of age, gender, status, or disability.

New technologies, along with government statutes and access by third parties to data, can threaten confidentiality agreements, although both state and federal courts have been willing to uphold promises of confidentiality made to research participants. Techniques to maintain confidentiality of data include data encryption and electronic security. Some types of data such as video recordings, photographs, and audio recordings require special care in order to protect participants' privacy. Distortion of the images and sounds is possible, but the most important safeguard is to obtain permission from the participant to use the material, including the dissemination of the findings.

Similarly, qualitative research poses special difficulties for maintaining privacy and confidentiality (Turnbull, 2000). Techniques for maintaining confidentiality include the use of pseudonyms or fictitious biographies and the coding of tapes and other data recording methods in which participant identification cannot be disguised. Researchers must also take reasonable precautions to ensure that participants respect the privacy of other participants, particularly in research settings where others are able to observe the behavior of the participant.

## Debriefing

Debriefing provides the participant an opportunity to discuss the findings of the study. Adequately debriefing participants in a research study is a clear ethical responsibility of the investigator, although it is still the exception rather than the rule. Debriefing can serve four purposes. It can (a) remove fraudulent information about the participant given during the research process, (b) desensitize subjects who have been given potentially disturbing information about themselves, (c) remove the participants' negative arousal resulting from the research procedure, and (d) provide therapeutic or educational value to the participant. Even participants who are screened out of a study or voluntarily withdraw from a study should be debriefed and told why they might have been eliminated from the study.

## Ethical Issues in Conducting Research with Vulnerable Populations

An important ethical concern considered by IRBs is the protection of those who are not able fully to protect themselves. While determining vulnerability can be difficult, several types of people can be considered vulnerable for research purposes, including people who (a) either lack autonomy and resources or have an abundance of resources, (b) are stigmatized, (c) are institutionalized, (d) cannot speak for themselves, (e) engage in illegal activities, and (f) may be damaged by the information revealed about them as a result of the research (Sieber, 1992). One of the principle groups of research participants considered to be vulnerable includes children and adolescents. In addition to legal constraints on research with minors adopted by the United States Department of Health and Human Services (DHHS), ethical practices must address issues of risk and maturity, privacy and autonomy, parental permission and the circumstances in which permission can be waived, and the assent of the institution (school, treatment facility) where the research is to be conducted. Research with psychiatric patients poses a challenge to the researcher. A major ethical concern with clinical research is how to form a control group without unethically denying treatment to some participants, for example, those assigned to a placebo control group. One alternative to placebo-controlled trials is active-controlled trials.

A number of ethical issues arise when studying families at risk and spousal abuse. Investigators must report abuse and neglect, and participants must understand that responsibility before giving consent. Other ethical issues include conflict between research ethics and the investigator's personal ethics, identifying problems that cannot be solved, and balancing the demands made by family members and the benefits available to them.

Alcohol and substance abusers and forensic patients present particular problems for obtaining adequate informed consent. The researcher must take into account the participants' vulnerability to coercion as well as their competence to give consent. The experience of the investigator in dealing with alcoholics and drug abusers can be an important element in maintaining ethical standards related to coercion and competence to give consent.

One final vulnerable population addressed in the literature includes those who are cognitively impaired (Karlawish & Sachs, 1997). The question here is: who speaks for the participant? Research with vulnerable participants requires the researcher to take particular care to avoid several ethical dilemmas,

including coercive recruiting practices, the lack of confidentiality often experienced by vulnerable participants, and the possibility of a conflict of interest between research ethics and personal ethics.

## Ethical Considerations Related to Research Methodology

### *Ethical issues in field research*

Research conducted in the field confronts an additional ethical dilemma not usually encountered in laboratory studies. Often the participants are unaware that they are being studied, and therefore no contractual understanding can exist. In many field studies, especially those that involve observational techniques, informed consent may be impossible to obtain. Similarly, some laboratory experiments involving deception use procedures similar to field research by introducing the independent variable as unrelated to the experiment. Covert research that involves the observation of people in public places is not generally considered to constitute an invasion of privacy; however, determining when a reasonable expectation of privacy exists may be difficult, for example, behavior in a public toilet (see Koocher, 1977).

Because assessing whether participants have been harmed in covert studies is usually impossible, opinions regarding the ethicality and legality of such methods vary markedly. Four principles to consider in deciding on the ethicality of covert field research are (a) the availability of alternative means for studying the same question, (b) the merit of the research question, (c) the extent to which confidentiality or anonymity can be maintained, and (d) the level of risk to the uninformed participant. Asking individuals who are similar to those who will be observed about whether or not they would give permission if asked to participate is a valuable way to address these ethical concerns.

### Ethical issues in Internet research

The Internet provides an international forum in which open and candid discussions of a variety of issues of interest to behavioral scientists take place. These discussions provide an opportunity for the behavioral scientist to *lurk* among Usenet discussion groups, Internet Relay Chat, and Multi-user dungeons (Miskevich, 1996). Cyberspace is typically considered public domain where privacy is not guaranteed and traditional ethical guidelines may be difficult to apply. A second ethical concern in Internet research is the possibility for online misrepresentation. For example, children or other vulnerable populations could be inadvertently included in research.

To address these concerns, a set of informal guidelines for acceptable behavior in the form of netiquette has developed (Smith & Leigh, 1997). Among other things, the guidelines suggest that researchers should identify themselves, ensure confidential treatment of personal information, obtain consent from those providing data whenever possible, provide participants with information about the study, and be sensitive to possible unanticipated consequences to participants as a result of the research process, particularly potential harm in the form of stress, legal liabilities, and loss of self-esteem.

## Online Training Programs in Research Ethics

### *CITI Training Program*

The University of Miami has developed an online educational training program in research ethics called Collaborative IRB Training Initiative or CITI. The CITI program consists of 17 modules for biomedical investigators and 11 modules specifically prepared for investigators conducting social/ behavioral research. Each participating institution has the flexibility to set the curriculum for their learners. Multiple Learner Groups can be established to customize the course to the learner's role in human subjects research. Each module focuses on a different aspect of research. Each module, developed by experts in the IRB community has an associated quiz. The software maintained at the University of Miami, compiles the quiz scores. When the user completes the required materials, the leaner can print/ download a Completion Report that details the learner's accomplishments. A copy of the Report is emailed to the institutional key trainer or IRB administrator. The course is hosted on a secure server and the CITI office retains all records in strict confidence.

Each participating institution has the opportunity to post specific material on an institutional page that their faculty and students should be familiar with. The students/trainees can even be quizzed on this material if that is desirable. CITI charges a user fee of $1000 per year to offset the administrative costs of running the site. This also includes the set up fee for the institutional page. There are no limits on how many members of an institution may go through the course. CITI can prepare an institutional page in a few days. For details, see http://www.citiprogram.org/citi_information.asp.

## Online Research Ethics Course

The University of Montana, with support from the Office of Research Ethics, Department of Health and Human Services, has developed a free online training course. The course includes 6 modules that cover (1) an overview of ethical issues in research, (2) interpersonal responsibility, (3) institutional responsibility, (4) professional responsibility, (5) animals in research, and (6) human participation in research. Each module provides information on major issues and contains at least one case study to allow exploration of different options, as well as an assessment tool so the student can test his or her knowledge of the area. Once the student has successfully completed the section assessment, he or she may print out a certificate of completion for the section. To access their web site, go to the following: http://ori.hhs.gov/education/products/montana_round1/research_ethics.html.

### *NIH Research Ethics Training*

The National Institute of Health has a course that is required of all NIH personnel and available to others. The topics covered in their course include (1) scientific integrity, (2) data acquisition and management, (3) publication and authorship, (4) peer review, (5) mentor/trainee relationships, (6) collaborative science, (7) human and animal subjects, and (8) conflict of interest and commitment. Their course is available at: http://researchethics.od.nih.gov/. These courses in research ethics are useful but should not be the only ethical training the undergraduate student researcher receives. Mentors must reinforce the training and help students apply what they have learned in the online training program. In general, the faculty mentor must model ethical practices and help students grapple with the ethical dilemmas inherent in the actual research project they plan to conduct. While online course can assess the extent to which students have learned ethical facts, the application of ethics is more of a decision making process than an informational set. Thus, mentors should talk with their students about why and how to apply ethical rules as well as what those rules are. For example, student researchers should explore what they should and should not do to ensure informed consent. Students should discuss with their mentors what they must tell the participant about their study and why some information can and should be omitted. Students should also learn how to properly debrief participants. Only by thoroughly exploring such issues can students truly learn to be ethical investigators.

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# Section 2. Successful Models of Undergraduate Research

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# The University of Wisconsin-Eau Claire: An Institutional Model for Excellence in Undergraduate Research

**Christopher T. Lind**

***University of Wisconsin – Eau Claire***

## Institutional Background

The University of Wisconsin-Eau Claire (UW-Eau Claire) is a regional, comprehensive, public university situated in rural northwestern Wisconsin. The university is located in the City of Eau Claire with a metropolitan population of about 151,000. UW-Eau Claire is 1 of 13 baccalaureate degree granting institutions in the University of Wisconsin System operating under a single Board of Regents. UW-Eau Claire is primarily an undergraduate, liberal arts based, institution. The 10,063 undergraduate students largely reside at or near the university, and the majority are traditional college age students. The university has four colleges: the College of Arts and Sciences, the College of Business, the College of Education and Human Sciences, and the College of Nursing and Health Sciences. Undergraduate students may pursue 80 undergraduate degree programs in a wide range of majors and minors within liberal arts disciplines and professional programs. There are also 503 graduate students pursuing Master's degrees in 14 graduate programs. The university has 360 full-time faculty and 75 non-tenure track instructional academic staff with teaching assignments. In the 2005 classification scheme of the Carnegie Foundation for the Advancement of Teaching, UW-Eau Claire is a Master's/M institution.

In 1988 the UW System Board of Regents established a Center of Excellence for Faculty and Undergraduate Student Research Collaboration (Center of Excellence) at UW-Eau Claire. This center had the following goals:

- Enhancing the quality of undergraduate education by providing students with an opportunity to participate with faculty in research projects,
- Keeping the undergraduate curriculum vital and updated by incorporating the results of current research into the curriculum,
- Promoting the development and vitality of faculty teaching in undergraduate programs,
- Facilitating collaborative research among faculty and students representing diverse undergraduate programs in order to identify and address problems requiring multidisciplinary solutions,
- Encouraging undergraduate students by way of their successful research to consider advanced studies in their disciplines, and
- Providing public service and contributing to economic development

Since its formation, the Center of Excellence has grown from a "good idea" to a thriving and active research and creative activity support center within UW-Eau Claire. This center is the only Center of Excellence within the UW System focused on undergraduate research, and it operates with an annual budget in excess of $700,000. These funds support a variety of grant programs involving undergraduate students and faculty in outside-of-class research, scholarly, and creative collaborative work. More than 40% of the faculty engage in activities sponsored by the Center of Excellence. UW-Eau Claire's efforts to build strong programs to support research in the undergraduate experience have been acknowledged by the Council on Undergraduate Research (1985; Satz, 2001), the *Chronicle of Higher Education* (Geraghty, 1997), and *USATODAY.com* (Marklein, 2002). The National Conference on Undergraduate Research also awarded UW-Eau Claire funding in the first round of its NCUR/Lancy Initiative (Frankenberger, Lind, Carpenter, Snider, & Wendt, 2000). *U.S.News & World Report,* "America's Best Colleges 2007" (2007) listed UW-Eau Claire as 1 of 62 institutions throughout the nation recognized for its undergraduate research programs. Most institutions on this list are prestigious, private liberal arts colleges or research-intensive universities. Only five institutions on the list are regional, public universities.

## Current Programs of the Center of Excellence

Interested readers may find detailed information about the UW-Eau Claire Center of Excellence at http://www.uwec.edu/orsp/programs/centerofex.htm. Below is a summary of the various programs:

**Faculty/Student Research Collaboration Grants** are designed to facilitate the initiation and development of collaborative research projects between students and faculty. Projects under this program intend to provide students "hands on" experience in the research process. Awards for the academic year do not exceed $2,800, and funds may be requested for student stipends, supplies, and travel. It is expected that approximately three-quarters of the award will be used for student stipends.

**Summer Research Experiences for Undergraduates Grants** seek to facilitate undergraduate research and scholarly activity during the summer. Summer grants include a student stipend of $2,000 and up to $2,200 for the faculty research mentor. In addition to the stipends, each collaborative project is eligible to receive up to $500 for supplies, services, and travel. Projects under this program should lead to presentation of results at meetings of scholarly organizations and, where possible, provide baseline data for inclusion in proposals to extramural funding agencies.

**Student Travel for the Presentation of Research Results** awards are made to assist students traveling to regional, national, and international professional meetings in order to present the results of collaborative research. These awards do not exceed $500 and are intended to encourage students to submit the results of their research for dissemination at professional meetings. Last year 193 undergraduate students presented scholarly papers and posters at professional meetings with the assistance of these funds.

The **Kell Container Corporation Scholarship for Faculty/Student Collaborative Research** provides one student each year with full resident undergraduate tuition, fees, room and board, and project expenses. This scholarship was created and is endowed through the generosity of Kell Container Corporation of Chippewa Falls, Wisconsin, in order to offer a premier award for an undergraduate student who is involved in faculty/student research collaboration at UW-Eau Claire. The scholarship is supplemented with project expenses for a student stipend, supplies, and travel through the Center of Excellence. In addition the faculty mentor receives a $2,200 stipend during the project period.

Through **Diversity Mentoring Project** awards, special consideration is given to funding projects that include low-income students and students of color. When a Diversity Mentoring Program student is added to a scholarly project, additional student stipend and supply dollars are also added. Awards do not exceed $2,000, and funds may be requested for student stipends, supplies, and travel.

As a condition of all of the above awards, students are expected to present the results of their work at the annual **UW-Eau Claire Student Research Day**. This event highlights student research accomplishments and the important role that faculty play as mentors in the scholarly activity process. Participants in arts and humanities, behavioral and social sciences, business and professional studies, and physical and natural sciences are welcome. In the first UW-Eau Claire Student Research Day held in 1993, 60 undergraduate students presented 51 posters with 42 faculty mentors. The 2007 event, 15 years later, involved 245 poster presentations by 414 students and 156 faculty mentors. UW-Eau Claire students are also encouraged to participate in the "Posters in the Rotunda: A Celebration of Undergraduate Student Research" held for legislators in the Wisconsin State Capitol rotunda and the UW System Symposium for Undergraduate Research and Creative Activity.

The Center of Excellence also produces two publications. The first, **Scholarly Contributions of the Center of Excellence** (Lind & Bodelson, 2005), is a publication that provides abstracts documenting peer-reviewed journal articles and presentations at professional meetings that UW- Eau Claire undergraduate students have authored or co-authored. In the last report, covering the 2003-05 biennium, more than 200 students with faculty mentors from 27 academic departments reported co-authored intellectual property in a broad array of academic disciplines. In all cases a complete citation of the work is provided, and in most instances a published abstract is also included. The second publication, the **Proceedings of the UW-Eau Claire Student Research Day**, is an annual document providing an abstract of each presentation made at the annual UW-Eau Claire Student Research Day.

## A History of Growth and Development

Undergraduate research and the use of research as a teaching tool had its origins at our university in early1960's. The 1988 proposal to establish a center for undergraduate research at UW-Eau Claire documents these early efforts (University of Wisconsin-Eau Claire, 1988). The subsequent almost 50 year history offers some insight into the

development of the current Center of Excellence and UW-Eau Claire's position at the forefront of a national movement to enhance undergraduate education through research collaboration between faculty and undergraduate students. In the early years and into the 1980's, departments in many disciplines including arts, humanities, sciences, business, education, and nursing made small amounts of funding available for supplies and sometimes student help to assist faculty engaged in research, scholarly, and creative endeavors. The university also created internal faculty support programs such as its University Research and Creative Activities grants and its Time Reassignment Incentive Program to assist faculty engaged in research. These awards often included modest support for undergraduate student participation in the proposed projects. Typically these internal grants supported about 20 projects per year involving undergraduate students (University of Wisconsin-Eau Claire, 1988).

In 1987 the UW System Board of Regents sought proposals for the creation of Centers of Excellence in the State's comprehensive universities. UW-Eau Claire with its long-standing interest in undergraduate research put forward a proposal to create a "Center for Faculty and Undergraduate Student Research Collaboration" (University of Wisconsin-Eau Claire, 1988). The Center of Excellence proposal contained a budget request of $396,500 in the first year and $423,700 in the second year seeking support for faculty time reassignment, summer stipends, student help, service and supplies, travel, library acquisitions, and so forth. By autumn 1988 Regents had approved creation of the Center of Excellence at UW-Eau Claire, but because of budget constraints, Regents provided no funding for the new center. This outcome was a financial disappointment, but on the positive side, our concept was endorsed at the highest level of the UW System. With this endorsement, the UW-Eau Claire Center of Excellence for Faculty and Undergraduate Student Research Collaboration was formed in 1988 with the limited funds at hand. This center was not to just a conceptual center but a real center with centralized management for proposal solicitation, review, and funding. However, the center was also without walls, encompassing the entire university.

The central problem facing the newly formed Center of Excellence was to secure adequate ongoing funds to meet the growing interest in faculty/student collaborative research. External funds through federal grants provided research equipment and infrastructure on a project-by-project basis, and over the next five years the university committed additional budget from a newly established UW System Undergraduate Initiative program. The UW-Eau Claire Foundation contributed funds to support undergraduate student research and its presentation, and the UW-Eau Claire Office of University Research shifted funds into the growing Center of Excellence.

During the next six years, three new programs emerged to support undergraduate research. A small student research collaboration program began in 1989. The program made very limited funds available on a one-time basis for modest project costs. By 1992, this program evolved into the Faculty/Student Research Collaboration grant program, but there was a limit of $600 for awards. In that year, the grant program supported 26 undergraduate students from various departments including English, biology, geology, history, music, physics, political science, psychology, business administration, nursing, and social work. A Student Research Day, started in 1993, was a showcase for faculty/student collaborative research. This event took the form of a poster session, and administrators encouraged all students involved in outside-of-class, undergraduate research to participate. In 1994, a student travel grant program emerged to aid students giving papers or posters at off campus professional meetings.

By 1996, internal funding for faculty/student collaborative research exceeded $112,000, and the Center of Excellence supported more than 200 students through Faculty/Student Research Collaboration grants and the Student Research Presentation Travel Program. The Annual Student Research Day poster session that year included presentations from 229 students. Growth accelerated.

Funding for the Center of Excellence made a significant and lasting advance in 1997 as a result of a university-wide strategic planning effort. Led by the Vice Chancellor for Academic Affairs in coordination with the University Senate, a faculty commission, and the Student Senate, this effort, entitled "Re-definition of the Baccalaureate Degree", was a review of the entire baccalaureate program. This review led to curricular reform aimed at strengthening general education, providing more interdisciplinary courses, and reducing the number of credits required for graduation. The new degree, set at 120 credits, had a balance of 60 general education credits and 60 credits within a major and minor. The reform proposed "capstone" courses near the end of a major that often included a research element, and significantly for the Center of Excellence, it encouraged an expansion of faculty/student research collaboration. Other proposed innovations included a first year seminar to introduce students to the academic and cultural life of the university, and a service-learning component to the degree.

Funding to expand these experiential programs was not available in the university budget, but discussions with the Student Senate yielded remarkable results. An enlightened body of leaders within the Student Senate studied the issue, held open discussions with the student body, and weighed the merits of the proposed enhancements to undergraduate education at UW-Eau Claire (University of Wisconsin-Eau Claire (40th session), 1996). As outlined in an article in the *Chronicle of Higher Education* entitled "A University Enlists Its Students in Improving Undergraduate Education," Geraghty (1997) wrote "the students themselves voted to increase their tuition by $50 per semester, to help pay for sweeping changes in the undergraduate curriculum." This tuition increase created a $1,000,000 pool of money called "differential tuition" to be used toward the goals of the re-defined degree.

The Student Senate agreed to this tuition increase on the grounds that they would be involved in approval of the areas for spending the funds. The first area approved by the Student Senate was faculty/student collaborative research, and the Senate passed a resolution designating 30-35% of total differential tuition to support faculty/student collaborative research. This income brought the total funding available for collaborative research and travel to present research results to more than $432,000 in 1997. In subsequent years the Student Senate voted to increase differential tuition to $65 per semester and beginning in 2004-05 to an annual increase of 4.5% thereafter (University of Wisconsin-Eau Claire (46th session), 2002). The Student Senate evaluates the results of their investment annually and votes on the distribution of differential tuition funds by major category for the next year. The Student Senate has consistently maintained support for undergraduate research at 30-35% of total differential tuition. Funding for the Center of Excellence now stands at over $700,000 annually with support from differential tuition, internal UW-Eau Claire budget, UW System, and the UW-Eau Claire Foundation. Differential tuition provides about 86% of the total.

## Benefits to the Institution and Lessons Learned

The forward to this book and subsequent chapters touch on many of the benefits to students and to faculty through engagement in research. There are also big returns to the institution for their considerable investment of time and money in this effort. UW-Eau Claire's investment in the Center of Excellence allows us to leverage these funds by attracting grants from the federal government and other grant sources. National Science Foundation grants for Research in Undergraduate Institutions (RUI), for example, require an undergraduate research impact statement. Placing the proposed research in the context of activities of the Center of Excellence and demonstrating the university's commitment to research in the undergraduate experience aids in acquiring these federal grant funds. Importantly federal research grants bring faculty summer salaries and research instrumentation that are beyond the scope of our internal Center of Excellence programs.

The combined effects of strong internal and extramural research activities benefit students, faculty, and the institution. These activities contribute to an enhanced research infrastructure critical to building an academically rich environment where faculty and undergraduate students engage in important scholarly pursuits. Mentoring and collaborating with undergraduate students also provides an avenue for developing the intellectual life of the university. These activities increase the reputation of the institution and allow it to attract high quality students and faculty. Many newly hired faculty indicate that the strong faculty/student research collaboration programs at UW-Eau Claire were a primary consideration in their decision to come to our institution. These faculty form the future of UW-Eau Claire and hopefully a continued commitment to faculty/student collaborative research.

The growth of undergraduate research at UW-Eau Claire and the Center of Excellence success is underscored by years of commitment and many lessons learned. First, no faculty/student research collaboration effort can survive without a dedicated faculty willing to invest the time for individualized learning through participation with undergraduates in research and creative activities. A critical mass of our faculty value mentoring undergraduate students even when it adds workload to their already full academic lives. Secondly, administrative leadership and foresight is required at the top level of the university to protect and advance financial support for undergraduate research. At UW-Eau Claire the Director of the Center of Excellence is also the Assistant Vice Chancellor for Research and Sponsored Programs and a member of the Vice Chancellor for Academic Affairs' staff. This arrangement puts the administrator most knowledgeable about faculty/student research collaboration "at the table" when there are discussions and decisions for competing funding priorities. Finally, key to the success of the UW-Eau Claire Center of Excellence for Faculty and Undergraduate Student Research Collaboration has

been an enlightened and diligent body of student leaders willing to invest in advancing the quality of their own undergraduate education and degree.

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# Undergraduate Research at the University of Nebraska at Kearney: Building and Sustaining the Culture

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A full-scale institutional commitment to undergraduate research involves creating a campus culture that supports and reinforces students and faculty for their participation. The campus culture is a powerful source of motivation for both faculty and students. Goldhaber (1993) defines culture as the "pattern of beliefs and expectations shared by the organization's members – which produce norms that shape the behavior of individuals and groups in the organization" (p. 69). There are many ways that colleges and universities can create a vibrant sense of mission and a distinctive culture that supports undergraduate research. To do so, institutions need to consider their guiding principles. What is the guiding vision for undergraduate research within the institution? How does this vision fit into the institutional mission? If undergraduate research is integral to the institutional mission and vision, then the implementation policies and programs supporting it become part of the climate and, in time, culture.

Strong student-faculty relationships have been and continue to be a focal point of the University of Nebraska at Kearney (UNK) experience. Instruction centers on personalized, individualized teaching-learning relationships between faculty and students in which "scholarly activities are understood to be intrinsic ingredients of good teaching, as they enrich the curriculum, provide individualized intellectual growth opportunities for faculty and students, prepare students for advanced and continuing study, involve them in experiential learning opportunities and exemplify the commitment to lifelong learning" (UNK Strategic Planning Committee, 2007, p. 3). The belief in hands-on-learning and the confidence that undergraduates are capable of making meaningful contributions to research are cornerstones of the culture of strong faculty-student teaching/learning relationships.

## Institutional Background

UNK is a mid-sized, comprehensive, public university located in central Nebraska. It is one of three universities in the University of Nebraska system operating under a single Board of Regents. UNK is Nebraska's public university that is distinguished by its emphasis on undergraduate, residential education. Personalized attention for students is a hallmark of UNK's education with 80% of first time freshmen returning for their second year. In a typical year, UNK draws students from approximately 45 states and 46 foreign countries as well as every county in Nebraska. Total enrollment approaches 6,500 students, about one-third of whom live in 10 traditional residence halls, two Greek complexes, and one apartment-style complex on campus. The University has four colleges: the College of Business and Technology, the College of Education, the College of Fine Arts and Humanities, and the College of Natural and Social Sciences. More than 170 undergraduate degree options and over 20 pre-professional programs are available. A unified general studies program provides undergraduates broad familiarity with diverse academic disciplines. UNK also enrolls approximately 1,300 graduate students in 45 graduate programs. The university has 309 full time faculty and 68 non-tenure track instructional staff. UNK is a Master's/M institution in the Carnegie Foundation for the Advancement of Teaching classification.

The faculty at UNK has long been committed to programs that involve undergraduates in the research and creative activity process, but it has only been in the last 10 to 12 years that the university has begun to institutionalize the undergraduate research environment. In 1992, the UNK chapter Chapter of Sigma Xi listed undergraduate research projects conducted during that year. The report focused only on those research activities in which the students acted as the principal investigators and did not list projects for which the students acted as research assistants to faculty members. Undergraduate students from 4 colleges and 11 departments/ programs completed approximately 126 research projects during 1992. In the last decade, the research opportunities for undergraduates on the UNK campus

have steadily increased. On-campus activities supporting undergraduate research are now common.

Although UNK has not established an office for undergraduate research, many of the undergraduate research and creativity initiatives are organized through the Office of Graduate Studies and Research and the Office of Sponsored Programs. In the fall of 2002, in response to the growing prevalence and importance of undergraduate research on campus, the administration approved the formation of the Undergraduate Research Council (URC), operated under the Office of Graduate Studies and Research. The budget for the URC is part of the UNK Research Services Council through the Office of Graduate Studies and Research. Additional financial support is available through the Student Talent Development funds, monies available through the Dean's office of each college, and specifically allocated funds from the Office of Sponsored Programs. The mission of the URC is to support and promote high-quality undergraduate research, creative activity and inquiry-based learning in all fields of study with faculty mentors. Composed of faculty and student representatives from each college, the council serves as an advisory group to the Dean of Graduate Studies and Research. It also serves as a forum for recommending and implementing activities supporting undergraduate research and creative activity.

## Current Initiatives in Undergraduate Research

Although the Office of Graduate Programs and Research and the Undergraduate Research Council oversees a number of undergraduate research initiatives, it also provides resources and forums designed to provide more coordination among the many campus programs that support undergraduate research, while still maintaining the autonomy of these programs in their respective units. Below is a summary of programs supported out of the Office of Graduate Studies and Research.

### *URC Research Grants*

These grants are intended to support student-originated and student-conducted research and creative activity. Faculty serve as mentors on these projects and are responsible for the financial components. The awards are competitively selected several times each year. Applicants may request up to $400 may be made for operating expenses, supplies and travel.

### *Summer Student Research Program (SSRP)*

The SSRP is a program designed to develop collaborative research projects between students and faculty. Participating students work one-on-one with a faculty member to develop and implement original research and creative projects. Activities are designed to provide a broad understanding of scholarship across disciplines. Activities include a research methods seminar, weekly meetings, field trips, a fall symposium to present papers, and presentations at the National Conference for Undergraduate Research. Students are paid $3,000 for participation of 20 hours per week. Faculty receive stipends of $1,800 for mentoring one student and $2,700 for mentoring two students.

### *Student Travel for Research Presentations*

Funds are available to assist undergraduate student presentations at scholarly meetings. The Office of Graduate Studies and Research funds a maximum of $300 with documentation that the project has been accepted and the student is presenting. Students may obtain an additional $300 from the Student Talent Funds available through the Senior Vice Chancellor for Academic Affairs Office. Other funding may be available through the department or through the dean's office in each college. We expect students supported through this program to participate in the UNK Student Research Day (SRD) held during the spring semester.

### *UNK Student Research Day*

The SRD was initiated in 1999 and gives students the opportunity to present the results of collaborative research and creative activity conducted with faculty members. The purpose of SRD is to highlight and celebrate student research and give recognition to the faculty who provide the opportunity for this research. The day includes a poster session, oral presentations, musical performances and an art exhibition. We present awards for outstanding research and creative activity in several categories.

### *Undergraduate Research Journal and Other Publishing Opportunities*

Each year the UNK Undergraduate Research Council publishes the *Undergraduate Research Journal.* Any manuscript written by an UNK undergraduate student is eligible. Each department can select up to four manuscripts for submission to

the URC. The URC and other faculty and students serve as the editorial board. Approximately 20 articles are accepted for publication. The *Carillon* is the official literary journal for Sigma Tau Delta (English Honor Society) and is supported by the Office of Graduate Studies and Research. Any UNK student who has a creative work may submit to this journal for review. The *Carillon* features the writings of both undergraduate and graduate students.

### *Undergraduate Research Mentoring Awards*

The Faculty Awards for Mentoring of Undergraduate Research are career awards to any faculty member who is making a significant impact by supporting and mentoring undergraduate students in research and creative activities. The awards are intended to recognize demonstrated excellence in mentoring undergraduate researchers, to encourage mentoring relationships with undergraduate students, and to convey the campus' high regard for such contributions made by the faculty of the academic and research community. We give four awards each year, one for each of the four colleges. Nominations are reviewed by a committee in each college. Faculty members chosen to receive the awards demonstrate a commitment to undergraduate research through specific examples such as peer-reviewed publications involving undergraduates; student presentations, showings, or performances; and evidence for the continuing success of mentored students in the research endeavor.

## Future Considerations

Although UNK has made great progress in establishing and building a culture of undergraduate research, we recognize that there is more we can do in order to strengthen and sustain that culture. We have targeted three main areas for priority attention. The campus should consider establishing an Office of Undergraduate Research in to direct students to existing opportunities, advertise and promote established programs, and assist in the development of new opportunities for research. Although there are numerous research avenues available to students, there is no program that pairs lower level undergraduates (i.e., freshmen and sophomores) with faculty mentors over a long period of time (e.g., a research apprentice program or research fellows program). Along with the establishment of a research apprentice or fellow program, the university needs to consider options for funding both students and faculty for participating in such a program. The third priority is to develop more effective assessment procedures to track more effectively the impact on student learning. Although this information is often gathered at the departmental level, we need a system that provides more complete information from across the university.

As UNK continues to bring undergraduate research into the mainstream of the academic culture, it will need to address a broad range of issues in addition to the three priorities above. We need to reward faculty who engage in mentoring of undergraduate research. Although additional pay might be an incentive or reward to some individuals, it is also important that we recognize their work through the promotion/tenure process and/or other meaningful forms of recognition. We need to provide incentives and resources to support departments as they develop undergraduate research opportunities. Many of the undergraduate research experiences are directed by individual faculty. Resources could be designated to support initiatives at the departmental or college level. In addition, undergraduates should have the opportunity to participate in interdisciplinary research and initiatives should be established that promote interdepartmental research opportunities. Finally, UNK needs to develop a more effective method for tracking participation in undergraduate research. Campus-wide tracking of participation will allow us to document progress and more completely assess the impact of research opportunities on student learning.

UNK continues to grapple with issues surrounding the creation of a "culture" of undergraduate research. Most of the barriers are financial, particularly as budget cuts in recent years have impacted the development of new initiatives and programs. The belief that participation in research is an integral part of the undergraduate learning experience continues to be a positive, driving force in the creation of new opportunities. More importantly, the administration views undergraduate research as a catalyst for creating new teaching and learning environments for both students and faculty.

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# Summer Undergraduate Research Experience: A Model for Student Participation in a Competitive Grants Program at the University of San Diego

**Kenneth D. Keith, Lisa M. Baird & Michael Ichiyama**

***University of San Diego***

Psychology faculty have recognized the importance of research skills to a strong undergraduate curriculum (McGovern, Furumoto, Halpern, Kimble, & McKeachie, 1991), and various writers (Landrum & Davis, 2004; Purdy, Reinehr, & Swartz, 1989) have noted the role of research experience as preparation for graduate education. Further, psychology teachers see research as a useful teaching tool (Chapdelaine & Chapman, 1999).

Involvement of undergraduates in research has shown some increase in recent years (Kierniesky, 2005), despite the fact that many students undertake studies in psychology without a recognition of the significance of methodological skills to their professional development (Bailey, 2002). Most teachers of science would agree that we must be effective in teaching research methods (e.g., Ware & Brewer, 1999), and that students learn research skills best via active engagement (McGovern et al., 1991)—by actually *doing* science and collecting data through "real" research.

If students are to participate in a meaningful way in conducting scientific investigation, they can benefit greatly from collaboration with faculty mentors. Davis (2007) articulated numerous benefits associated with such collaboration, for both students and faculty. However, students and faculty may lack necessary resources to devote significant time and effort to research projects, particularly during summer breaks when students may find it necessary to earn income to support their education. In recognition of these challenges, in the year 2000, we established the University of San Diego Summer Undergraduate Research Experience (SURE) program, with the cooperation of six departments (biology, chemistry, marine and environmental studies, mathematics and computer science, physics, and psychology).

## University of San Diego

The University of San Diego (USD) is a private university, enrolling approximately 7,500 students in the College of Arts and Sciences and five schools (Law, Leadership & Education Sciences, Nursing, Business, and Peace and Justice). USD is classified as a national research university, although the College of Arts and Sciences, with about 4,000 students, and housing the psychology department, is a traditional undergraduate liberal arts program. The department has 12 full-time faculty and several adjuncts, with **a**pproximately 300 undergraduate majors and no graduate programs.

The psychology department has a long history of fostering undergraduate research and offers a typical empirically-oriented curriculum. The culminating experience for students in the psychology major is completion of an upper-division research laboratory in 1 of 9 topic areas (animal behavior, biopsychology, clinical, cognitive, cross-cultural, developmental, health psychology, learning and behavior, social). The labs aim to foster library research skills, student development of research topics, and preparation of APA-style research reports (Keith, Meerdink, & Molitor, 2007).

## Nature of the SURE Program

The SURE program is a competitive summer research grant project open to returning students (i.e., not seniors). The coordinating faculty circulate a call for proposals each year in November, with proposals due in February. In consultation with a faculty mentor, student investigators (singly or in pairs or small groups) develop a research idea, prepare a short proposal and budget, and submit their proposals to the SURE committee. A six-member faculty team (one from each core department) evaluates the scientific merit and clarity of the proposals and makes decisions about funding. The SURE coordinators generally make funding announcements prior to spring break, so that students have sufficient lead time to make their summer plans.

SURE funds are provided by the Office of the Dean of the College of Arts and Sciences, and the

Office of the Provost, as well as from external grants that include funding for student researchers. The funding base for 2007 was $118,000. The program guidelines provide for maximum summer stipends of $3,000 per student and $3,000 per faculty member ($4,000 for multiple students) for full-summer projects with proportional stipends available for briefer studies. The review committee may also provide somewhat reduced faculty stipends in an effort to fund more projects if such reduction does not substantially alter or jeopardize a particular proposal. The program also provides on-campus housing allowances and funds for research supplies. As a condition for participation, student researchers must agree to present a summary of their work in a SURE-sponsored poster session in the fall semester following their summer experience and in a university-wide research conference the following spring.

## Student and Faculty Participation

### *Departmental participation*

The mean annual number of applications submitted to the SURE program since its inception is 32. Of these, the program has provided funding for an average of 25 projects each year, producing a funding level of 78%. In recent years, SURE has expanded somewhat, with a small number of applications coming from departments of engineering, communications studies, and health sciences. Thus, over the life of the program, applications have been submitted by students from biology (30%), chemistry (20%), psychology (19%), math/computer science (14%), marine science (7%), and physics (5%), with smaller proportions from the remaining departments.

### *Student outcomes and evaluations*

SURE-funded projects have led to student authorship of many conference manuscripts and professional publications. In psychology, at least one project resulted in a national student research prize (American Psychometric Society), and two have won the Psi Chi award for best research poster at the Western Psychological Association convention. When evaluating their experience in the SURE program during a recent year, students using a scale from 1 (*Poor*) to 5 (*Excellent*) gave the overall experience a mean rating of 4.53, and the quality of the research experience in particular an average of 4.65. On a scale from 1 (*Definitely Not*) to 5 (*Definitely*), they produced a mean rating of 4.29 when asked if their results were interesting or valuable, and a mean of 4.71 when asked if they would participate in SURE again or recommend it to a friend.

### *Administrative Issues*

A program such as SURE does not spontaneously emerge in a university environment in which funds are at a premium, faculty are already working hard, and students do not recognize the importance of research experience. And SURE probably would not exist if several departments had not come together to present a cooperative, coordinated front in approaching university administrators for funding and the kind of symbolic support that advocate research as an important, visible activity.

The core SURE departments had a long history of encouraging undergraduate research. However, in coming together in a sustained and coordinated effort, they were able to develop a program that no one department could have achieved by working alone. Currently, a faculty member from psychology and one from biology serve as coordinators of the SURE program, and they and their colleagues must continue to advocate each year for ongoing funding and support. Although some projects perhaps do not merit funding, it is essential that the program maintain sufficient funding to support those that do; there would be little advantage to maintaining a program that might discourage students whom faculty are trying to encourage.

## Summary Thoughts

Students give SURE high marks; the program meets their expectations for a quality research experience, and a large majority of students would participate in SURE again. Student researchers gain confidence that they can produce interesting results, present their results in scientific venues, and even publish their results in scientific journals. Many students have been successful on all counts. The competitive grant structure has also taught student participants something about the real world of research—the reality that justifying funding and accepting critical review are both a part of the process. In addition, the multidisciplinary nature of SURE may help students to develop an appreciation for the relationships among various branches of science.

Finally, the program has succeeded in producing the kind of student-faculty collaboration that Davis (2007) discussed and the opportunity for students to experience in scientific activity the kind of satisfying,

engaging process that Keith, Meerdink, and Molitor (2007) advocated. As a result, these student researchers have taken a step toward the kind of ability, persistence, and experience that will serve them well as they move to graduate education or professional work in which the skills of critical thought and analysis are essential.

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# A Successful University-wide Model of Undergraduate Research: Utah State University

**Joyce Kinkead**

***Utah State University***

When Karlie, a first-year music major focusing on opera at Utah State University, wanted to get intensive study in vocal anatomy, which meant instruction in and access to the anatomy lab, we made a fairly easy match with the faculty member who oversees the facility. Karlie's rather unorthodox request was facilitated because she was a University Undergraduate Research Fellow. The Fellows Program recognizes students with a passion for a particular field of study before they enter the institution and offers them an annual stipend and support from the central Office of Research's Undergraduate Research Program. Karlie got the one-credit independent study course to study the parts of the body involved in production of sound, and the program paid the honorarium for the faculty supervisor.

## Institutional Context

Utah State University is a land- and space-grant research-extensive institution in northern Utah, 80 miles from the state capitol. The main campus is situated in Logan and the Cache Valley. The mountain valley is a metropolitan area of 100,000 residents. The university enrolls 23,000 students, the majority on the main campus but some 5,000 are distributed among regional campuses and distance education centers. Slightly more than 80% of the enrollment is undergraduate.

Over 200 undergraduate degree programs are offered. The University has seven academic colleges: Agriculture; Business; Education and Human Services; Engineering; Humanities, Arts and Social Sciences; Natural Resources; and Science. The University employs over 800 faculty members. Important research centers include the Space Dynamics Laboratory; Center for Persons with Disabilities; the Ecology Center; Center for Advanced Nutrition; Center for Integrated Biosystems; Utah Water Research Laboratory; and the Agriculture Experiment Station.

## Undergraduate Research Fellowships

The University Undergraduate Research Fellowship at Utah State is a signature program of undergraduate education and the Office of Research. The design of the program is for students who are interested in graduate or professional study following the undergraduate degree; who are ambitious; who may be interested in preparing for major fellowships such as the Rhodes, Truman, Goldwater, or Udall; and who want to make a difference in their communities and the world. The fellowship offers students the experiential learning that will result in dividends when applying for graduate study. We invite students who receive the institution's Presidential Scholarship to apply for the fellowship, and if they do so, they interview with faculty teams during a spring Scholars Day when we celebrate all students receiving a scholarship. Annually, we choose 30-40 students for the Fellowship program from a first-year class of approximately 2,500.

Fellowships extend across the campus and may be in any program. Fellows may work on assistive technology projects for the Communicative Disorders and Deaf Education department, do archival work in Special Collections on African-American wills in colonial Virginia, or join the electric snowmobile team. Karlie laid out a program of study that included language training in Italian, French, and German; study abroad; participation in opera productions; and knowledge of the larynx and lungs through her work in the cadaver lab.

The Associate Vice President for Research (AVP) oversees the Fellows at the university level, organizes the competition, makes the awards based on faculty recommendations, and evaluates the Fellows on a semester and annual basis. In addition, the AVP authored the guidebook that all Fellows use as a manual to their fellowship experiences. The Office of Research organizes university-wide meetings of Fellows, particularly in the beginning of each academic year. The AVP also does much of the public relations concerning the Fellows, including communicating with parents about their successes.

The Office of Research includes a marketing/public relations staff—primarily student interns—that produces several publications and press releases to tell the story of research overall and of the value of undergraduate research in particular.

Key to the Fellowship experience are the associate deans of the academic colleges, who have several responsibilities. They tend to have the crucial task of matching Fellow to faculty mentor. Usually this matching occurs very early in the fall term. The College of Science is an exception because it offers a weekly seminar to its Fellows who are exposed each session to a different research experience: computer science, the Center for Integrated Biosystems, the Center for Advanced Nutrition, insect lab, co-evolutionary biology, atmospheric studies, and so on. Fellows in Science may select a laboratory rather quickly or wait until the end of the term.

The associate deans bring their Fellows together as a community in socials and also spotlight them in college receptions and events. In some cases, department heads or undergraduate research advisors may also be involved, identifying potential mentors and projects. The faculty mentor works with Fellows on research, scholarly, or creative goals, providing space and equipment as needed to the Fellow. The mentor is largely responsibility for inducting the Fellow into the "club" of research in the discipline, making transparent methodological approaches and educating the Fellow about responsible conduct of research and safety standards. The faculty mentor exemplifies what it means to be a scientist, social scientist, humanist, or artist—by action and word. The mentor is also the first line of defense if there are issues with the Fellow—personal problems, academic trouble, or cause for celebration.

Regular evaluation of the student to determine continuation of the fellowship occurs at the end of each academic year. The mentor is important not only for direct supervision of the Fellow but also for the crucial link the faculty member provides to the professional world: networks with other faculty at and beyond the campus; preparation for presenting at on-campus symposia or at regional and national professional meetings; letters of reference for awards and graduate school. The AVP shares with mentors helpful publications such as Merkel and Baker's How to Mentor Undergraduate Researchers (2000) and Entering Mentoring (Handelsman, Pfund, Lauffel, & Pribbenow, 2005) developed by a team at Wisconsin and endorsed by the Howard Hughes Medical Institute.

Expectations for the Fellows are clearly articulated in their guidebook. The first one is communicate, communicate, communicate. Primarily this expectation refers to communication with the mentor—defining roles and responsibilities—but it also means communicating with any other key personnel such as the associate dean, AVP, or director of Honors. Fellows, who wish to change majors, meet with the AVP to discuss strategies and options. Students who desire to change mentors or majors must do so diplomatically.

The Fellows by default serve as ambassadors for the undergraduate research program, a voice for the Fellows Programs. They participate on panels at the annual Scholars Day, telling prospective Research Fellows about their experiences, answering questions, and offering advice. We frequently call on them to represent the institution. For instance, at an annual luncheon for legislative spouses, we feature a particular college's undergraduate researchers. Students from Psychology, for example, share posters of their work on guilt, media and adolescence, and strategies for success among stepfamilies in rural areas.

We also advise the Fellows to take advantage of opportunities in their field of study, such as department brown bags and guest lectures. We encourage study abroad and the Service Learning Scholars program if there is interest.

The Honors Program serves as an important support system for the Fellows, offering staff and peer advisors and advocating for Fellows on several fronts. A "scholarship prep" course helps all students interested in applying for prestigious fellowships, such as the Rhodes, including drafting applications and holding mocktail parties and dry-run interview sessions.

Fellows enroll in Scholars Forum, the gateway course in the Honors Program. Students do not formally matriculate into Honors until they have had a "taste of Honors" in their first term, which include an Honors general education course, possibly an Honors math course, and Scholars Forum, a one-credit, on-line module-based class. Scholars Forum enrolls all Honors-eligible students, approximately 18% of the entering class, and introduces them to opportunities at a research university. The Forum requires them to develop a goals profile, outlining academic, scholarly/research, leadership, physical, and personal goals. Too often, first-year students enter higher education without the social, cultural, and political capital to take advantage of opportunities. For instance, applying for a Rhodes Scholarship involves establishing a trajectory that begins in year one of an undergraduate's career. The same holds true for many goals: obtaining a summer research fellowship or internship, graduating with Honors, getting into the professional or graduate school of choice, or gaining employment with a top company.

## Grant Programs

The Office of Research exists to help all students on campus, not just the Fellows. Multiple pathways exist for students to engage in hands-on learning on campus. The Undergraduate Research and Creative Opportunities (URCO) Grant Program is funded by the Office of Research through returned overhead. Two rounds of competition occur annually with orientation workshops prior to each. Faculty review teams evaluate the proposals and vote on funding. A proposal to create sculpture is just as likely to win support as a proposal to investigate the co-evolutionary relationship of salamanders and poisonous snakes. With a goal to fund as many proposals as possible, the Office of Research offers a liberal revision policy. Students who receive awards are treated just the same way as faculty investigators and receive information on fiduciary responsibility from the Budget Officer of Research. Reports detailing results and finances are due approximately six months following the award although extensions can be granted.

Summer fellowships offered on campus through foundation grants or national agencies are publicized through the office, and assistance is available to help with the application process. The National Science Foundation Research Experience for Undergraduates (REU) grants are particularly popular as are the American Heart Association fellowships. A student in Physics might spend the summer at Dartmouth studying nanotechnology, whereas another student might work on an autism project at the University of California-San Francisco.

## Curricular Innovations

Undergraduate research is present in the curriculum in several ways: methods courses, independent or directed study, and writing courses. The Office of Research instigated three approaches to support undergraduate research. First, at the instigation of the AVP, two faculty members revamped the research writing class (English 2010), which is a requirement for general education, to incorporate an introduction to research integrity, knowledge that any educated citizen should know. The compliance officered developed a course for advanced undergraduates and graduate students. This Research Integrity course focuses on the responsible conduct of research via case studies, and it addresses the following: mentor/mentee relationships; publications and authorship; conflicts of interest; scientific misconduct; data management; protection of human subjects; and the ethical care and use of animals in research. This latter course has become part of a larger Graduate Student Certification program that also includes information on mentoring undergraduate researchers.

A university-wide course number is also available—USU 4900—in case a department does not have its own course for undergraduates to receive credit. Finally, a student may request a transcript designation as an "Undergraduate Research Scholar" at graduation.

## Dissemination and Travel

Research is not really concluded until the investigator has disseminated it. An annual celebration of student research, scholarship, and creative activity takes place each spring. This Student Showcase highlights oral and poster presentations from across campus. In addition, at that time awards are made on a college-by-college basis for Outstanding Undergraduate Researcher of the Year and Outstanding Undergraduate Research Mentor of the Year. A university fund-raising campaign, which includes the undergraduate research program, brought in an endowment to fund the student awards.

During each legislative session, the university takes its best students to the State Capitol Building where they explain their posters, which are displayed in the Rotunda, to their home district legislators. This event was created in 2001 when we became aware of legislators' misperceptions about the role of a research university in an undergraduate's education. "Research is a distraction from the business of teaching," they said. A few years into the event, a key senator told the press, "there is no doubt about the value of a research university to an undergraduate's education." Mission accomplished.

Students also have the opportunity to share their work at the Utah Conference on Undergraduate Research (UCUR), which was established in 2007; the National Conference on Undergraduate Research (NCUR); and "Posters on the Hill" sponsored by the Council on Undergraduate Research. The Office of Research funds expenses associated with these events. For other professional conference presentations, student government supports travel through its Academic Opportunity Fund. The dramatic increase in the number of our undergraduates accepted to present at meetings in their field of study signaled a need for financial support. Fortunately, student government positively responded to a request from the Office of Research to consider setting up a parallel fund to the one that existed for graduate students. The number of requests for support continues to grow; as a result, the

research office has included travel support in its fund-raising campaign.

The Boyer Report (1998) on undergraduate education in research universities noted that "A research university is in many ways a city; it offers almost unlimited opportunities and attractions in terms of associations, activities, and enterprises" (p. 8). The goal of our Undergraduate Research Program is to assist in making those opportunities happen, just as we were able to find a place in the anatomy lab for an opera singer.

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# Institutionalizing Undergraduate Research at Murray State University

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***Murray State University***

Murray State University (MSU), located in far-western Kentucky and classified as a Masters I institution, is one of six public comprehensive universities in the Commonwealth. Officials consider two research universities, University of Kentucky and University of Louisville, to be the state's "flagship" institutions. MSU serves an undergraduate (~8,000) and graduate (~2,000) student body of just over 10,000 students. Although MSU is working to increase the number of its international students, most students come from the 22 counties in the university's western Kentucky service region or from one of the counties in Tennessee, Missouri, Illinois, and Indiana that is adjacent to Kentucky. Underrepresented minorities comprise approximately 7% of the student body. A significant number of MSU students come from first-generation, low-to-modest-income families. Few of these students come to MSU with the expectation that they will pursue advanced degrees.

In 1998, a small number of relatively isolated faculty engaged undergraduates in research at MSU. Psychology, biology, and modern languages hosted small, departmental oral presentation sessions. In 2001, the University, with partial assistance from a Howard Hughes Medical Institute award, created the Undergraduate Research and Scholarly Activity (URSA) office. That year, URSA hosted *Scholars Week*, a campus-wide celebration of undergraduate and graduate student research, scholarly and creative work, with just over 150 student participants. By 2007, *Scholars Week* featured over 1,000 student oral presentations, posters, performances, and exhibits.

What brought about this dramatic change in only a few years? URSA, under the direction of its faculty Advisory Board[1], worked to raise the visibility of the undergraduate research activities that already existed, worked one-on-one with individual faculty to encourage and help them create opportunities for their students, and began to help MSU undergraduates understand that good grades and a college diploma, although important, are not all they need to make themselves competitive after graduation. URSA accepted a broad definition/interpretation of research, scholarly and creative work, enabling the program to grow to its present level of activity. Historically, psychology, biology, chemistry, and modern language faculty have been the leaders on campus at providing their students with opportunities to engage in research and scholarly work. Today, we are seeing increasing numbers of students in the fine arts, history, social sciences, and agriculture engaging in faculty-mentored research and scholarly experiences.

With Advisory Board guidance, URSA created several programs designed to support and grow undergraduate research on the MSU campus. Already mentioned, *Scholars Week* celebrates our undergraduate and graduate students' research, scholarly and creative work and is our largest activity. Registration for *Scholars Week* is on-line and the program encourages participation by allowing any student who has a faculty mentor/sponsor to present the results of his/her work. Students give oral presentations, display posters, perform, and exhibit their work. Approximately 100 of MSU's 400 faculty sponsor students' *Scholars Week* work annually.

As a public institution, significant MSU funding comes from the state legislature. If we expect our legislators to support undergraduate research, they must understand the value of this kind of engaged learning experience. It should be kept in mind that for the most part, this kind of learning opportunity was not available to our legislators when they attended college. To help ensure that members of Kentucky's House and Senate and the Governor understand the importance of undergraduate research, MSU's URSA office created *Posters-at-the-Capitol.* This collaborative event among Kentucky's eight public universities (six comprehensive universities and two research universities) sends undergraduates to the capitol to present the results of their work to the state legislators. In 2001, the first year of the event, approximately 85 students participated. In 2007, this number grew to over 220 participants (the maximum number of students the capitol can accommodate). The students present posters of their

work and arrange individual meetings with their hometown and campus House and Senate members. Additionally, eight students are selected annually (one from each university) to give oral presentations on their work in the Capitol rotunda. The Organizing Committee (consisting of one representative from each campus) works to ensure that there is a broad representation of disciplinary areas. An important lesson was learned during the first few years of *Posters-at-the-Capitol*. Many student participants knew their representatives on a personal level. Some of our student participants and/or their parents have worked on the campaigns of their House or Senate members. This kind of relationship gives these students tremendous credibility with legislators and drives home the message in ways that a university or a university employee cannot.

Two important developments related to *Posters-at-the-Capitol* occurred in 2007. For the first time, students from Kentucky's Community and Technical College System presented the results of their research at *Posters*. Second, members of the organizing committee and other individuals identified by the eight university provosts collaboratively developed a proposal to fund a statewide undergraduate research fellowship program. This proposal is currently being considered by Kentucky's Council on Postsecondary Education (the higher education governing body in Kentucky). We hope the proposal will become part of the Council's 2008 legislative budget recommendation.

Two initiatives that provide students with financial support have been developed as part of the URSA program. A grants-in-aide program provides undergraduates with the opportunity to obtain up to $500 to support faculty-mentored research, scholarly, and creative work for non-classroom projects. These funds may be used to support travel for field work, supplies, equipment, and other related expenses. Interestingly, these funds have enriched students' international study abroad experiences by enabling them to travel to museums, libraries, and even cemeteries (to study funerary art) that otherwise they would not have been able to do. In the 2006-2007 academic year, the URSA office added a small number of undergraduate research fellowships to its portfolio of initiatives. These highly-competitive fellowships provide our students with a $2,000 stipend, a $500 supply budget, and a $500 mentor stipend.

Publishing is an important step in the research process. To give our students an opportunity to publish, MSU's president has provided support to publish *Chrysalis: The Murray State University Journal of Undergraduate Research*. This journal publishes 8 to 10 of the best undergraduates works submitted to the journal annually. Works by students from a wide array of fields, including psychology, biology, organizational communications, art history, English, chemistry, and music have been published in the journal.

An important initiative, and one that we have not been able to find on many campuses, recognizes the important contributions of faculty to our undergraduate research program. In 2007, MSU awarded its first Distinguished Mentor Award to two faculty for their outstanding contributions to mentoring MSU students. Each faculty member received $1,000 and is recognized at the May commencement. Dr. Paula Waddill, from the Department of Psychology, and Dr. Terry Derting, from the Department of Biology Sciences, each received an award in its inaugural year.

Building on the base that the URSA programs provided, the URSA director undertook the task of developing a proposal to secure funds through the Department of Education's (DOE) McNair Scholars Program. This DOE initiative provides undergraduates from first-generation-college, low-income families, and from underrepresented groups with research opportunities and other support to encourage their pursuit of PhD degrees. The program was funded at MSU in 2003 at $220,000 per year and has provided 22 students annually with the opportunity to engage in a faculty-mentored research project, receive assistance with the graduate school application process, and obtain scholarship support. The McNair program has also enabled us to increase the number and disciplinary areas of our faculty mentors and to provide these mentors with modest honoraria ($500) and travel support for their mentoring work.

What lessons have we learned over the past six years? We continue to find that engaging undergraduates in research, scholarly, and creative experiences changes our students' lives. Historically and from national data we know that students who come from low-income, first-generation-college families do not pursue advanced degrees in large numbers. Yet what we have found both anecdotally and in studies such as those that have been done at the University of Michigan (Hathaway, Nagda, and Gregerman, 2002) is that students who have engaged in research as undergraduates go to graduate school in larger numbers than their peers. At MSU, a person simply needs to consider what the undergraduates who have conducted research under the direction of Drs. Alysia Ritter, Joel Royalty, and Paula Waddill in the Department of Psychology have done. As an example, recently-graduated undergraduate research scholars they mentored, who came from first-

generation-college families or underrepresented groups, are pursuing PhDs in social psychology at the University of Illinois-Chicago, clinical/health psychology at the University of North Texas, and school psychology at Temple University. Graduates of the MSU McNair program are now pursuing a PhD in mathematics at the University of Tennessee in Knoxville, Masters degrees in engineering at Purdue University and the Colorado School of Mines, and a PhD in criminal justice at Indiana University. Would those students have pursued those degrees without involvement in undergraduate research? That outcome is a possibility, but the data strongly suggests that the likelihood would have been very small.

Did we learn any other lessons? We learned that it takes persistence, a dedicated faculty, and the development of our undergraduates' understanding of their fuller potential, a fact that is particularly true for those who come from low-income, first-generation-college families, or underrepresented groups. If the United States is going to successfully compete in a global marketplace that has "flattened" (Friedman, 2005), we must work to ensure that our graduates realize their true potential. For an increased number of our students that outcome means pursuing advanced degrees. For those of us who have the good fortune to work at institutions that serve large numbers of first-generation-college students and/or students who come from low-income and underrepresented families, we have a great opportunity to make a difference. My belief is that our country's future success will be determined by how well we do our jobs.

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[1] The URSA Advisory Board consists of two faculty from each of the universities' five colleges (Humanities and Fine Arts; Science, Engineering and Technology; Health Sciences and Human Services; Business and Public Affairs; and Education), the School of Agriculture, and one representative from the library. The URSA office is staffed by a half-time director and a half-time program specialist.

# Creating and Sustaining a Culture of Undergraduate Research: A Psychology Department's Report on Success

**Lynn H. White**

***Southern Utah University***

Southern Utah University (SUU) is a regional, comprehensive university of approximately 7,000 full and part time students. SUU offers a limited number of master's degrees, but this number is slowly increasing. Located in an area of rural Utah which is predominantly low-middle SES, the University services many first generation students. Many of our students are non-traditional (e.g. married with children and returning students).

The psychology department at SUU has grown steadily over the years to approximately 220 declared majors, taught by eight full time faculty and one advisor who also has a part time teaching load. The majority of our faculty involve themselves heavily in university service: faculty senate, curriculum committees, leave, rank, and tenure committees, human and animal research ethics committees, and the Undergraduate Research Program to name but a few. Despite most of our faculty having a 4/4 teaching load, we all mentor students in undergraduate research projects. Except for some modest funds, which we sometimes receive from the Provost's Faculty Development Grant Program and SUU's Undergraduate Research and Scholarship Program (UGRASP), rarely do we have any outside funds to support our research.

In 1998, our faculty began attending the annual meetings of the Rocky Mountain Psychological Association (RMPA). For several years, we have been accompanied by 20-50 of our students, many of whom present their research at the convention. Although our student-faculty collaborations only occasionally result in peer-reviewed journal ppublications, the list of regional, national, and international presentations is impressive. We have a reputation at SUU and within the region as a department that places strong emphasis on undergraduate research as a valuable and necessary learning experience for our students and ourselves. How did this culture and tradition of undergraduate research evolve?

Prior to 1998, our department did not have a strong culture of undergraduate research or research in general. The faculty who did actively participate in research often did so in isolation or through collaboration with colleagues. Although we supported students who wanted to do research, our focus was on quality teaching and service to the institution. We also had not yet considered undergraduate research as a pedagogical tool. As new psychology faculty, some from R1 institutions, with research interests were hired, we began to witness an attitudinal change toward undergraduate research and education in general. Building on a strong foundation of support and encouragement from senior faculty, the value of undergraduate research as a pedagogical tool began to take shape. A turning point occurred when we added new research courses to the curriculum. One such course was the senior thesis capstone course, Senior Project – Independent Research (IR). Much like senior theses courses at other universities, IR requires students to come up with a research question, review the literature, design an experiment/study to answer the question, secure IRB approval, collect and analyze the data, and submit an APA style thesis. Two problems were immediately apparent to us after the first year.

First, we became aware that enrollment would have to be restricted to a manageable number. One course instructor was responsible for teaching and supervising all the students' projects, a difficult task if all students were afforded the time and advice required for successful completion of their projects. Second, only a minority of students were able to complete all the course requirements in a single semester.

We attempted to rectify these problems by capping enrollment at 15 and by soliciting help

from psychology faculty. Faculty began serving as supervisors (mentors) for some of the students. These changes helped, but the problem of having students finish on time persisted. With some trepidation, we decided to adopt a two course, six credit sequence: IR1 (fall semester) and IR2 (fall/spring semester). In IR1, students attend weekly seminars on topics designed to facilitate the development of their research question, review the literature, design their study, submit an IRB proposal, and write an APA style introduction for what will become, for most students, the introduction to their senior thesis. Every attempt is made to tailor the seminars to the students' individual research projects and reduce the amount of "busy work" students are required to complete outside of class. Once a student has a solid research proposal, he/she secures a psychology faculty advisor. The advisor and student cooperate on the project, and the final submission to the IRB is the result of their combined efforts.

In IR2, students (supervised by their advisors) collect and analyze their data, and complete the APA style empirical research report they began in IR1. Beginning in IR1, students and their mentors share the expectation that students will formally present their research off campus. However, their final grade in the course is not dependent on whether students achieve this expectation.

Implementing IR1 and IR2 has contributed to the culture of undergraduate research, a tradition that continues to evolve. Although only 7-10 students complete IR2 each year, most of them present their projects at professional meetings, and some also present their work at SUU's annual, campus-wide, student-faculty scholarship day. The psychology department also holds its own annual undergraduate research symposium at which these students present, along with students registered in the three introductory methods courses offered by the department.

There are additional reasons for the success of undergraduate research in psychology at SUU. First, the students who complete the IR1 and IR2 sequence tend to develop a strong sense of team spirit. We have tried to create an inviting atmosphere in the reception area of the main office, where students from IR1 and IR2 often discuss their progress or sometimes the lack of progress. These discussions frequently involve other students who happen to be there. Second, the attitudes among our faculty have no doubt played a critical role. Although not all of us engage in undergraduate research to the same extent, all of us believe in its value. We share these attitudes with our students in both formal and informal contexts. Several lectures of PSY 2010 (Models, Methods, and Professional Issues), a course required of all our majors, revolve around the value of undergraduate research and opportunities for engaging in it. We require all our majors to complete at least two introductory methods courses, each of which requires the completion of a research project. Several of our content courses, such as Environmental Psychology, also afford students the opportunity for research. Third, we have tried to reinforce the value we place on research through extrinsic rewards. We confer four awards of $100 each on students at our annual symposium, and the department recognizes one student each year as Research Scholar of the Year at the campus wide end of year awards and recognition ceremony. Fourth, our department has a designated undergraduate research liaison (URL). The URL's official responsibilities are to facilitate and promote undergraduate research within the department by (a) answering students' questions and concerns about research, (b) creating and maintaining a webpage on undergraduate research for our department, and (c) serving as a bridge between the department and the central, campus-wide program for undergraduate research and scholarship. Finally, our department sponsors both a chapter of Psi Chi and a psychology club. Students who participate in these organizations promote a culture of undergraduate research. Most of the money they raise each year goes toward funding students' travel to RMPA. They also sponsor an annual graduate school panel attended by many students, freshmen through seniors. Faculty on the panel stress the importance of undergraduate research as a requisite for graduate school admission.

Despite our success, we continue to struggle with various obstacles. Chief among these obstacles is the time required to supervise research projects. An advisor will easily invest 3-5 hrs per week per student. Thus, supervising three students often entails a weekly commitment of 15 hrs/week throughout the year. Our department recognizes the value and extent of this contribution. We keep track of the number of students each faculty supervises, and each semester we give one faculty a three credit course reduction. We do not have a formula on which to base our decision of entitlement. In the past, the decision was mutually agreed upon by

faculty at one of our frequent department meetings where a sense of fairness prevailed. This arrangement, of course, could become a problem. And, as the number of faculty grows, we will no doubt have to allot more than one, three credit reduction per semester. Otherwise, each of us could be waiting five or more years for our turn. The psychology department also weighs highly student-faculty research for leave, rank, and tenure considerations.

A second related problem is the struggle to gain recognition for our work from central administration. The uphill battle is not as steep as it has been. Last year, SUU created a centralized program for undergraduate research and scholarship (UGRASP). Currently, I serve as the program's director, and two of our faculty are on the UGRASP advisory board. This program supports undergraduate research, both students and mentors, financially and otherwise. As the program grows and a culture of undergraduate research continues to spread across campus, we are confident that additional resources and rewards will avail themselves. For example, with the encouragement of UGRASP, there is now an annual award for the Undergraduate Research and Scholarship Mentor of the Year. This award is from the faculty senate and paid for by the Provost's Office.

The third problem centers around the students themselves. Despite our best efforts, many students fail to appreciate the value of undergraduate research. IR1 and IR2 have a reputation for being labor intensive, and students resist taking these courses. Among students who recognize the value of these courses, intrinsic and extrinsic pressures to finish their degree quickly and often take precedence. Overcoming these resistances requires creativity and determination.

Each fall, our department "escapes" to an off-campus location for a retreat. Despite an emphasis on "eat", these retreats have been highly productive. At the retreat, we discuss philosophical and global issues and problems often resolve. No doubt, undergraduate research will be on this year's agenda again. Creating this culture took time. Efforts to maintain it are no less demanding.

# Morningside College: A Successful Model of Undergraduate Research

**Susan R. Burns**

***Morningside College***

Morningside College, located in Sioux City, IA, is a small, private, not-for-profit Liberal Arts College. Accredited by the Higher Learning Commission, Morningside is a member of the North Central Association. Morningside College is predominantly an undergraduate teaching institution and has approximately 1,400 students enrolled from 25 states and 8 counties. The college's mission statement notes the intent to promote "a passion for life-long learning and a dedication to ethical leadership and civic responsibility." With 16 academic departments, Morningside offers more than 50 undergraduate majors and a Master of Arts in Education with a variety of graduate endorsements.

The Psychology Department at Morningside consists of five faculty members, each of whom is trained in a different field of psychology (i.e., Experimental with an emphasis in Animal Learning, Industrial/Organizational, Counseling, Personality/ Social with an emphasis in Development, and Experimental with an emphasis in Educational Psychology and use of Technology). A unique feature of Morningside is that students, at the undergraduate level, are allowed to emphasize their psychology major in one of four areas: General Psychology, Counseling Psychology, Industrial/ Organizational Psychology, or Biopsychology. The department also offers two emphases for academic minors: General Psychology and Industrial/ Organizational Psychology. These emphases allow students to explore, in more depth, a specific area of psychology by taking a tailored set of classes.

There are a variety of characteristics that make Morningside College's Psychology Department a successful model for undergraduate research: integration of research in variety of lab (research-based) courses, group research opportunities, the senior thesis requirement for all psychology majors, and student coordination of and presentation at a cross-discipline campus-wide student research symposium. In this chapter, I will outline each of these features discussing details and benefits for students and faculty.

Research involvement through the context of a course is often the most effective introduction to the theory and practice of conducting psychological research. As Dunn (2006) noted, "laboratory courses in psychology involve 'hands-on,' active learning experiences for students, an opportunity for teachers to illustrate directly the power of the empirical method" (p. 125). Morningside offers four research or lab-based courses in addition to a traditional experimental psychology and lab course. These four-credit-hour courses (i.e., Experimental Social Psychology and Lab, Brain and Behavior and Lab, Learning and Memory and Lab, and Experimental Cognitive Psychology and Lab), not only immerse students in the content, but also offer lab-based activity with a research basis. The model that Morningside uses in which content is the primary focus and research involvement as secondary is consistent with Perlman and McCann's (2005) national survey findings of psychology departments. Perlman and McCann also noted that many departments require students be of junior status before they can take these lab-based courses. At Morningside, students may begin their lab-based course experiences as early as their first year, depending on when they have completed the introductory course; however, most students begin taking lab classes in their sophomore or junior year.

Each of these lab-based courses takes a slightly different approach to integrating research, but all have the common goal of giving students further experience and exposure to the research process in psychology. For example, in the Learning and Memory and Lab course, students have hands-on experience with operant conditioning principles and techniques while training their assigned rat. In Experimental Social Psychology, students design and propose empirical research projects and then, in groups of approximately three to five students, conduct research that has a social psychology emphasis. The benefit of course-based research approach is that students experience hands-on experience with the practice of research as Dunn (2006) suggested, but they are under more controlled

and direct instructor supervision than in group or independent research projects. The biggest limitation to integrating such courses into a curriculum is that those courses often involve more prep time and grading of lab reports and/or APA-style papers for the instructors who teach them. However, the benefit to the students taking lab-based courses far exceeds those limitations.

Group research opportunities are another effective way to involve students in research who are relatively new to the research process as well as those students who may not be ready for independent research but have a desire to get involved. See the chapter by Beins in this book on "Conducting Undergraduate Research: Research Groups" for additional insight in group research. The actual practice of involving students in group-research projects is quite variable. At Morningside, when supervising group research, faculty often offer research topic suggestions, but also allow for student input on ideas for research. Regardless of topic choice, faculty expect students to be equally involved in the project from beginning to end.

Although some of the group projects may stem from previous class-based projects, students conduct group research projects outside of the classroom context, and the process may or may not involve students receiving academic credits for their participation. As is the case at most institutions, Morningside offers a generic catalogue listing of "Research in Psychology." Students can register for one to four credit hours, as approved by their faculty research advisor, and then repeat this course for up to a total of six credit hours. However, not all students choose to register for the academic credit when they participate in group research. Frequently, group research projects take place over a two-semester sequence. Students spend the first semester designing and conducting the research, and in the second semester they present their findings and write for publication. Our students can get involved with group research as early as their sophomore year, but ideally they have taken both Statistics and Experimental Psychology and Lab courses to have an academic grounding in theory and practice.

Involving students in group research is an efficient strategy for getting a large number of students involved in research without a huge time commitment for the professor. Morningside College is a teaching college that supports research endeavors, but not at the sacrifice of teaching quality. Also, as is the case at a small college, our faculty often find themselves heavily engaged in service to the college through various committees. If you are at a similar institution, but still desire to engage undergraduates in research, group research projects can be an ideal approach. Group research is also an effective tool because students within the group often mentor each other through the process and practice of conducting research. Preferably, you will have the opportunity to include students with a diverse background in skills and abilities, and have a transfer of student experience from semester-to-semester and even year-to-year. This transfer promotes greater student autonomy and fosters students to mentor each other and new recruits. One of the many benefits of doing research in a group context is that students do not feel as anxious or nervous about the research process because they have peers (in addition to the professor) to rely on for support. This reliance occurs throughout the design and execution of the research and during the presentation and publication of the research as well.

In addition to group research opportunities, all Morningside College psychology majors have a requirement to complete a senior thesis that is either empirical or non-empirical. The senior thesis has multiple purposes. This requirement serves as a means for a capstone-type experience, integrating the knowledge, skills, and abilities they have developed during their four years at Morningside. The thesis requirement is also the Psychology Department's means for meeting the college-wide writing proficiency requirement. Students at Morningside, regardless of major, must complete a writing proficiency requirement to graduate. Departments have different strategies for meeting the requirement (e.g., course writing, portfolios of writing across classes and academic years, etc.), but for Psychology, a research-based thesis project is the most logical fit. Also because assessment is an important topic for departments and institutions of higher education, our Psychology Department has seized the senior thesis as yet another opportunity to assess the outcome of student learning.

Early in the fall semester, we advise seniors to select one of the psychology professors as the major advisor for their senior thesis and to begin working on their projects. Again, we designed the senior thesis project as a two-semester project. Students can finish their thesis within one semester, but most students prefer to take both semesters. Also, students have the option of enrolling in the generic research course for academic credit while completing their senior theses.

The senior thesis project takes on the style of an independent research project supervised by faculty, whereby students and their project-advising professors meet on a regular basis discussing the design and execution of the project. As is the case in group-research projects most of the design and execution of data collection occurs during the fall

semester, and the completion of the writing process and presentation of their project is in the spring semester. In addition to completing the formal write-up of their senior theses, students must also present their research either in oral or poster form at the annual Morningside College Palmer Student Research Symposium. This symposium is a campus-wide cross-discipline celebration of students' involvement and achievements that have a research basis. This outlet for students to present their research in a campus-designed convocation is not uncommon and offers great benefits to students (Rosenberg & Blount, 1988).

The final event that makes Morningside College a successful model of student engagement in research is student coordination of and presentation at our cross-discipline campus-wide student research symposium. During the 2003-2004 academic year, I challenged the group of students who did research with me to develop, under my guidance, the first annual Morningside College Student Research Symposium, a campus-wide demonstration and celebration of students' research across disciplines. Each of the students involved on the student steering committee have an assigned a position to delegate responsibility (i.e., Chair, Co-Chair, Volunteer Coordinator, Publicity Coordinator, Submissions Coordinator, Presentations Coordinator, Facilities Coordinator). The student steering committee members not only coordinated the conference, but they met with the College's President and the Dean requesting their moral support, attended at a general faculty meeting, and requested the support of the faculty to make this research event a success on our campus. In addition to their assigned duties, the students, as a group, must review and evaluate the submissions to this symposium. As Rosenberg and Blount (1988) suggested, having an outlet for student presentation of research encourages students' participation in research at the undergraduate level. Rosenberg and Blount described a departmental-based convocation, but Morningside has had success with a similar campus-wide outlet.

Each year, the symposium has grown in the number and variety of disciplines represented. Additionally, because of the success of the program, the Morningside College administration decided to fund our symposium in its second year and then secured an alumni donor to grow the symposium. We now have a budget that allows us to bring outstanding keynote speakers, to publicize the event on campus and within the community, and to cover expenses of an accompanying luncheon for presenters and their faculty sponsors without any cost to those in attendance. Because this symposium is student-led, students have an ownership and pride for their hard work, but they also have accompanying vita entries acknowledging their role in the coordination and implementation of a successful undergraduate research symposium.

## Summary

There are several different ways that psychology departments, small or large, can encourage student involvement in research. Professors at smaller colleges, like Morningside, have the luxury of getting to know students on a more personal level than professors at larger research institutions. Nevertheless, professors at smaller colleges often have the constraint of heavier teaching loads and service requirements to the college/university and thus may not have an ample amount of time to actively develop a program of research or engage students in multiple and diverse research projects. However, having said all of this, I firmly believe that Morningside College offers a model for how, even at a small college, faculty can find ways to involve students successfully in research through lab-based courses, group projects, senior thesis projects, and development and implementation of campus-based symposia as an avenue for students' presentation of their research.

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# Encouraging Undergraduate Research: Hanover College's Psychology Major

**John H. Krantz, Stephen Dine Young, T. William Altermatt, Ellen Rydell Altermatt, & Michelle H. Mamberg**

***Hanover College***

Undergraduate research is receiving increased attention across undergraduate disciplines (González, 2001; Hutchinson, 1992). The presence of this current volume indicates the importance of undergraduate research for the psychological community. One of the primary reasons for this increased emphasis is the realization that education needs to develop skills in students for life-long learning. Because of its potential to increase student investment in learning and to develop skills in critical thinking, reading and writing, student scholarship is one way to achieve this goal. The advantages of student involvement in research have been supported by several recent studies. Bauer and Bennett (2003) reported that graduates who had research experiences in college, compared to those who did not, reported greater proficiency in research design as well as more general skills such as acquiring information and public speaking.

Many of the gains from undergraduate research experience extend beyond the immediate academic domain. Compared to students who do not have research experience, those who do have such experiences report feeling more independent and self-confident (Seymour, Hunter, Laursen, & DeAntoni, 2004) and more prepared for a career (Lopatto, 2003). Moreover, these students are more likely to graduate (Nagda, Gregerman, Jonides, von Hippel, & Lerner, 1998) and are then more likely to pursue graduate education (Hathaway, Nagda, & Gregerman, 2002). The integration of scholarship into the psychology major at Hanover College is, in large part, based upon the understanding that the goal of education is to help students develop skills that extend beyond the classroom.

## A Description of the Hanover College Psychology Department

Hanover College is a 4-year liberal arts college of about 1,000 students. The psychology department is in the natural science division with biology, chemistry, exercise science, geology, math/computer science, and physics. Currently, the department has five faculty members. These faculty members have specializations in social, developmental, clinical and experimental psychology. The department graduates 20 to 30 psychology majors each year.

Hanover College has a long history of promoting undergraduate scholarship. This emphasis has increased in recent years, culminating in a revision of the undergraduate curriculum that recommended all majors require an independent study as the culminating experience. Many departments, including all of the natural sciences, already required independent studies for their culminating experiences by the time the college made this recommendation.

## A Description of the Major

The psychology major at Hanover College underwent a major revision in 2000, with the explicit goal of increasing the number of courses that required students to engage in original research. The reasoning behind this approach was twofold. First, as mentioned above, the department requires a independent study as the culminating experience. Generating activities that helped prepare students for that year-long exercise was beneficial. Second, by having students engage in projects in different classes, they would get a chance to use some of the many and varied research methods in psychology (Krantz, Dine Young, Altermatt, & Altermatt, 2004).

### *The First Three Years*

As depicted in Figure 1, we require students to choose one course from each box. The arrows indicate prerequisites. If there is more than one option in a box, then students can take any of the listed courses to fulfill the requirement. In addition to these courses, students must pick two other courses as electives. Student may choose these electives from any other psychology course in the catalog that

they have not taken to fulfill requirements. In addition, students must take a statistics course taught by the Mathematics department prior to research methods, and students must take a course in Biology.

Figure 1 highlights the emphasis on undergraduate research in the major. Boxes with a red outline indicate courses that have laboratory components in addition to the typical class sessions. Students take a minimum of 4 laboratory courses as part of the major curriculum. The biopsychology course and sensation and perception course can also fulfill part of a student's general science requirement. These courses aim to teach basic laboratory skills and procedures. In addition, these courses aim to use the laboratories to teach the fundamentals of doing a study, and they do leave room for students to design research to some degree. However, working in a laboratory is not the same as doing scholarship. If students are just following a prescribed set of directions, they are not learning how to ask questions using scientific methodology as much as they are learning scientific procedures and measurement techniques. As a result, the major curriculum structure builds on the initial laboratory courses and introduces more elements necessary in actually conducting research (Krantz, Dine Young, Altermatt, & Altermatt, 2004).

The courses shown in shaded squares in Figure 1 form the heart of our integration of research into the major. These courses require students to design and execute a research project. The sequence starts in the Research Design and Statistics class (PSY 220). Students taking this course learn the fundamentals of research design and how to use basic statistics to analyze data. Students work together in small groups to devise a research project, conduct the study, and then present it both to the class in a conference-style oral presentation and to the department in a poster session. This class is typically taught every term to keep enrollments to a manageable 12 to 15 students.

This foundational experience makes this course a prerequisite to more advanced laboratory and research-oriented courses in the major. In each of these 300-level courses, students again design and conduct independent research projects. These courses reinforce and build upon the experience of the research methods course and incorporate new methods specific to the course content. The learning course provides experience working with animals giving students experience with single subject methodology. The cognition course uses mostly repeated measures and factorial designs that are more complex than students usually encountered in research methods. Social psychology emphasizes between-subjects experimental designs, focusing on statistical interactions. In that course, students also design and administer an online research project (see Krantz & Altermatt, in this volume). In Adulthood and Aging, students work in small groups to conduct a quantitative research project using narrative research methods. Specifically, the instructor asks students to interview several elderly individuals using student-modified versions of McAdams' (1995) Life Story Interview. By reinforcing statistics and research methodology in the laboratory courses, we hope to maintain and develop skills that otherwise fade after the research methods course.

## *The Senior Year*

Seniors complete their careers as psychology majors by conducting a larger independent research project. The year-long sequence allows students to work either singly or in pairs. During the fall, students participate in a seminar entitled Advanced Research (PSY 401). The primary focus of this course is the development of a research proposal. During the first part of the term, the department faculty leads students through a sequence of activities to assist them in developing their research question and hypothesis. These activities include group discussions of articles they are reading; group discussions of their emerging research ideas; and one-on-one discussions of their ideas with two or more faculty members. About one-third of the way through the term, students write a short paper describing their project and identify two faculty advisors with whom they prefer to work. Application of several criteria, including student preference, faculty expertise and equitable faculty work load, play a role in assigning faculty advisors.

Subsequently, students work primarily with their faculty advisors to shape their project proposal. At the end of the term, students give an oral presentation of their proposal, inviting comments by all of the faculty and fellow students. The department faculty encourage students to take an active part in these discussions with the goals of developing a research group atmosphere among the students and providing support for each other. The written proposal is graded by two faculty members: the advisor and one other member of the department.

In the Research Seminar (PSY 462) course students carry out their proposal, including data collection, analysis, and writing. During the first half of the semester, students meet only with their faculty advisors and work on data collection and analysis. During the second half of the term, students and faculty resume meeting as a class to hear progress reports and practice presentations from each group. In this way, students practice public speaking skills and prepare for their final presentation. On the last

day of the term, students attend an undergraduate research conference at another institution. All of the students present their research at this conference. They also prepare a manuscript of their project in APA journal format, which is graded by two faculty members. The range of projects that have been completed by these students over the years has been impressive. A list of past projects is available at http://psychlab1.hanover.edu/Research/SeniorSeminar/.

## Resources

Implementation of senior projects demands considerable resources, particularly faculty time. By making the senior projects into a formal two-semester course, one faculty member can receive partial credit toward her or his course load for coordinating the first semester, and all faculty members can receive partial credit in the second semester. The department also helps fund the student projects, but usually the expense has been minor. Access to a large and diverse pool of participants can also be an issue, but with the availability of online research, this issue has become less of a concern (see Krantz & Altermatt, in this volume).

## Conclusion

The intention of the Hanover College Psychology Department approach is to engage all of its majors in the research process. We do not just teach students *about* psychological concepts and methods, but we expect them to *do* psychology. The curriculum gives students a strong foundation in how to go about asking and answering questions in a sound empirical manner. In addition, students repeatedly communicate their findings both in manuscript and presentation formats developing their ability to communicate their research. Our philosophy is that students are not simply being taught a research method, they are learning *a process of inquiry*. This experience prepares students who are going to graduate school in psychology, but it also prepares students who do not take that path. For example, even students who go directly into a business setting can benefit from the experience of following an extended project from beginning to end. Furthermore, the experience of working independently encourages them to take responsibility for work and for their learning. Most importantly, because they have learned how to ask and answer basic questions, they will have a better grasp of the "big picture" (i.e., why their work really matters), and they can be confident in the conclusions they reach.

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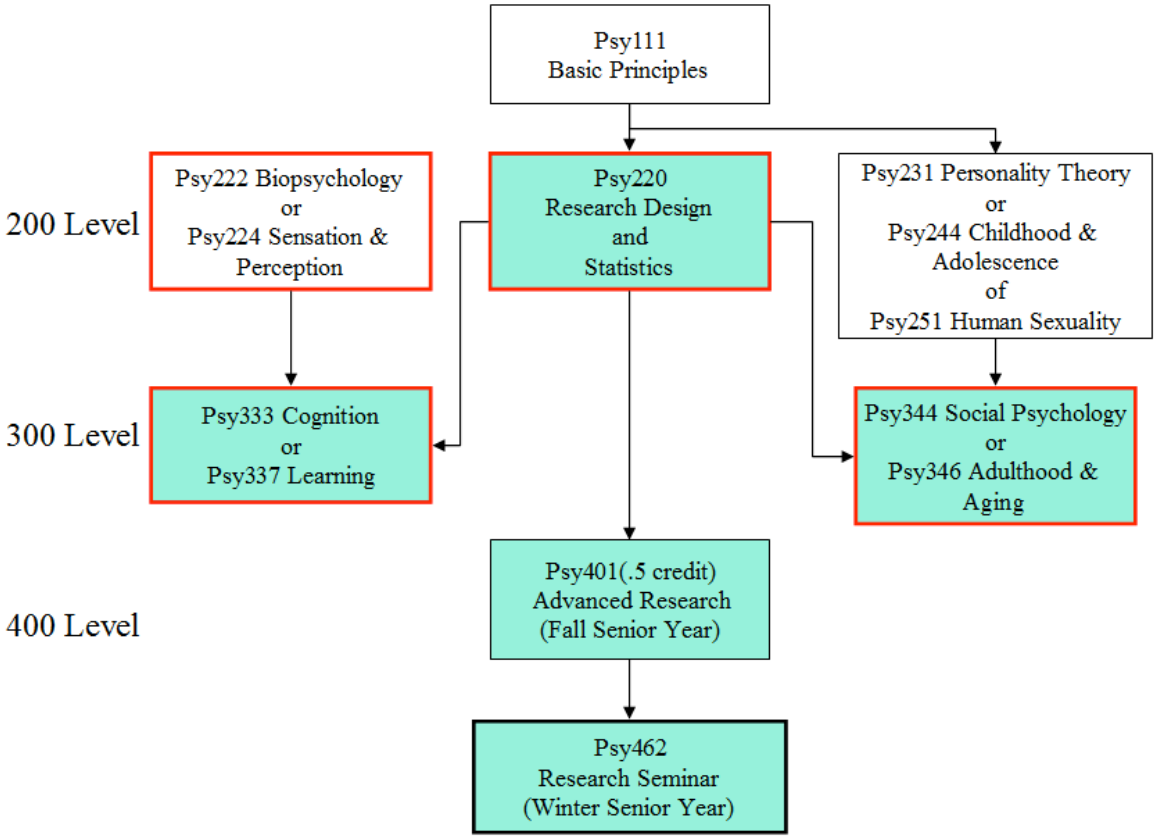


***Figure 1.*** **An outline of the Hanover College psychology major.**

# A Successful Model: Missouri Southern State University

**Christie Cathey & Gwendolyn Murdock**

***Missouri Southern State University***

The benefits of undergraduate psychology students actively engaging in empirical research are well documented (for a review, see Halonen, Brewer, Bell, & Miller, this volume). The Psychology Department at Missouri Southern State University (MSSU) strives to ensure all psychology majors, not just those who are bound for graduate school, reap the rewards of conducting research. The curriculum for psychology majors is therefore designed to prepare students gradually in all aspects of conducting research. This preparation culminates in each student completing an original, independent research project before graduation. In this chapter, we describe the three-course research preparation sequence all students must complete, the required senior thesis research project, as well as additional opportunities MSSU psychology students have to engage in research, including opportunities to conduct cross-cultural research. Finally, we discuss evidence for the success of this model for encouraging undergraduate research.

## Description of MSSU and the Psychology Department

MSSU is a state-supported, comprehensive university located in Joplin, Missouri, which has a population of about 50,000. The Carnegie Foundation for the Advancement of Teaching classifies MSSU as Bac/Diverse. The University has four schools: the School of Business, the School of Education, the School of Technology, and the School of Arts and Sciences. MSSU has its own Board of Governors and reports to the Missouri State Department of Higher Education. MSSU offers 65 baccalaureate degree programs, eight associate degree programs, and seven joint Master's programs that are offered in cooperation with other public four-year institutions in the state of Missouri. The University has 211 full-time faculty and 100 part-time or adjunct faculty. Of the approximately 5,600 students enrolled at MSSU, 35% are non-traditional students (24 years old and over) and 75% come from nine contiguous Missouri counties. Many psychology students are place-bound to the Joplin area, and about half of majors transferred into MSSU from local community colleges. The average ACT score among enrolled students is 21.

The Psychology Department is part of MSSU's School of Education. There are eight faculty members, who each represent a different psychology subfield, and 220 majors pursuing one of two degrees: the Bachelor of Arts (BA) or the Bachelor of Science (BS). Both degrees have the same psychology requirements, including completion of the three-course research preparation sequence and the senior thesis research project, but the BA degree includes an emphasis on foreign language, whereas the BS degree includes an emphasis on math or science. Thirty percent of current psychology majors at MSSU are pursuing the BA and 70% are pursuing the BS.

## Curriculum for Psychology Major

To graduate with a BA or a BS degree in psychology, students must earn 46 psychology credit hours. The curriculum serves to expose students to the breadth of psychology (by requiring students to take courses in child and adolescent development, conditioning and learning, memory and cognition, abnormal psychology, the biological basis of behavior, and social psychology or theories of personality), to encourage students to follow their specific interests within psychology (by allowing students to pick among a list of psychology electives), and to intensively train students to conduct research in psychology. We also require students to choose one of four 400-level electives: Psychological Measurement, Clinical Psychology, Advanced Research Projects, or a special topics seminar (e.g., Advanced Social Psychology, Positive Psychology, Animal Cognition) that encourages advanced study.

The University has a Writing Program that requires students to complete three Writing Intensive classes, in addition to the English composition courses. Psychology majors complete the requirement with three Psychology courses: Junior

Seminar (a course to prepare students for both employment and graduate school application processes), Experimental Psychology, which is part of the three-course research preparation sequence, and Senior Thesis, the capstone experience.

## Three-Course Research Preparation Sequence

The research preparation sequence begins with Applied Statistics, a three-credit hour course that exposes students to descriptive and inferential statistical techniques. We encourage students to take this course as early in their college career as possible. The prerequisites for Applied Statistics are a 'C' grade or higher in both General Psychology and in College Algebra. By the end of this course, we expect students to select accurately the type of statistical analysis to use with a given research design, to know how to analyze data by hand, and to know how to interpret results of their analyses.

After students have passed Applied Statistics with a 'C' or better, they may take the second course in the research preparation sequence, Computers in the Behavioral Sciences. In this three-credit hour course, students further hone their statistical skills by learning to conduct analyses using SPSS software, develop word processing skills necessary to produce an APA style document, and become familiar with library research skills using online databases such as *PsychArticles* and *PsychInfo*. By the end of this course, we expect student competency to set up data files, enter data, compute a variety of statistical analyses, and interpret output of analyses.

The final course in the research preparation sequence, for which Computers in the Behavioral Sciences is a prerequisite or co-requisite, is Experimental Psychology, a five-credit hour laboratory course. In this course, students work in groups to gain basic skills in carrying out all phases of a correlational study and a multifactor experiment, including conceiving a research idea, choosing a design and methodology, completing the IRB application form, collecting data, analyzing results, and writing reports in a professionally acceptable manner. A large focus of Experimental Psychology is on mastering APA-style, and we require students to write two complete APA-style reports of their research. Students in this course require considerable input from the instructor, particularly in the form of feedback on multiple drafts of APA-style manuscripts. Therefore, there is a limit of 15 students for this course.

## Required Senior Thesis Putting It All Together

Finally, after completing the three course research preparation sequence, psychology students take Senior Thesis, the three-credit hour capstone course. In this course, which we limit to eight students per section, students work independently to complete all phases of a research project on a topic of their choosing. Students in each section meet together with their instructor once a week for an hour. During this time, students brainstorm ideas and serve as research consultants for classmates' projects. Over the course of the semester, each student completes a literature review, designs a study, gathers materials for the study, completes the university's IRB application form, and collects and analyzes data. At the end of the semester, each student submits an APA style manuscript and gives a 12 min oral presentation of his or her study to a group of peers, psychology faculty members, and some administrators followed by a three minute session in which members of the audience can question the presenter. Each year, the collection of students' senior thesis manuscripts are bound and cataloged in the department's library to allow future students to see examples of completed research projects.

## Further Research Opportunities

### *Psychological Measurement*

Students learn the principles of questionnaire design and analysis, including item analysis in the Psychological Measurement course, a three credit hour elective. In this course, each student selects a topic on which to develop a questionnaire, develops the questions, administers the questionnaire to participants, and learns various techniques for assessing the items they generated. Some students have used the questionnaires they developed in this course as the basis for their senior thesis research. Students also develop more sophisticated skills in analyzing instruments that they might adapt to their own research projects.

### *Advanced Research Projects*

In addition to completing the three-course research preparation sequence and Senior Thesis,

students who are particularly interested in conducting research may take Advanced Research Projects, an upper-level psychology elective. In this course, which students typically take during the summer before Senior Thesis, students work alone or in groups to conceive and design a naturalistic observation, a survey, or an experiment of their choosing, gather and analyze data, and write up their results in an APA-style report. Many students use the research project for this course as a pilot study for the senior thesis.

### *Cross-Cultural Research Opportunities*

Few Missouri Southern students are from outside a 70 mile radius of the university, and because only 10% of MSSU students are members of ethnic minority groups, there are limited opportunities for students to interact with individuals from backgrounds and cultures other than their own. To enhance students' understanding of and tolerance for cultural differences and diversity, in 1995 Missouri Southern formally adopted an international mission and established the Institute of International Studies.

MSSU's international mission has increased the number of psychology students interested in conducting cross-cultural research. These students have taken advantage of the numerous opportunities that exist for conducting such research by examining cross-cultural differences for their senior theses. Recent examples of projects include a comparison of the use of self-serving biases between European American and Native American students, a comparison of national stereotypes between American and German students, and a comparison of rates of self-disclosure between Americans and British Virgin Islanders. For the latter two projects, rather than traveling abroad, students collected data by mailing questionnaires to instructors from Missouri Southern's international partner institutions.

To further facilitate students' cultural awareness and to enhance their understanding of cross-cultural research methods, the Psychology Department sponsored student trips to France in 2004 and 2006. The most recent trip was a 10 day trip in May 2006. To prepare for the trip, six students first took a seminar entitled, "Cross-Cultural Research," during the spring 2006 semester. For this course, students read about and discussed issues concerning cross-cultural research methodology, and they read about cultural differences between French and American individuals. Each student then designed and formally proposed (in an APA-style manuscript and in an oral presentation) an observational study and a survey designed to measure attitudinal differences between American and French students. French students, who were studying at MSSU, translated students' materials for their surveys into French. While in France, students collected data for surveys in classrooms at a French university and conducted their observational studies in parks, on streets, and in restaurants. After returning, students collected data from American samples as part of their summer course, Advanced Research Projects. They then analyzed the data, wrote APA-style manuscripts, and gave oral presentations of their findings.

Psychology students have also participated in campus-wide travel opportunities. In the summer of 2005, three psychology students traveled on the Southern-in-India trip. This trip involved spending four weeks at the University of Hyderabad, where these students conducted independent research projects under the direction of UH faculty. One student's study of teachers' attitudes about sex education was incorporated into her senior thesis project with her collection of local teacher's attitudes on her return to Joplin.

### *Funding Student Research*

Since 1990, a campus wide Student Research Grants Committee (SRGC) funds the costs of conducting research (photocopies, computer software, paying participants, purchasing questionnaire materials, etc.) and travel to conferences. Students receive up to $700 for travel to conduct or present research, but funding for equipment or supplies is theoretically unlimited. In the last five years, SRGC has funded conference travel and research supply costs for an average of 13 psychology students per year.

## Evidence of Success of Model

Of all the required psychology courses, Senior Thesis seems to incite the most anxiety among students. Before taking the course, many students remark informally about their fears about being able to finish an entire research project in one semester and about giving an oral presentation of their research. However, after completing Senior Thesis, students are very positive about their experiences. As part of an effort to assess graduates' opinions about their experiences as psychology majors at MSSU, we conducted a survey of alumni who graduated with a degree in psychology between 1994 and 1999. One open-ended question asked alumni to describe their thoughts about the requirement of Senior Thesis for all majors. Of the 42 respondents who answered this question, 36 were positive about the Senior Thesis

experience, five were ambivalent, and only one was negative. Although the oral presentation seems to be the most feared aspect of the Senior Thesis process, many respondents discussed the advantages of having gained experience in public speaking. Moreover, respondents reported having advantages in graduate school and in the workplace, including writing and analytical abilities that came directly from completing Senior Thesis. One student remarked:

"I think [Senior Thesis] was a crucial element in gaining a "competitive edge" among other grad school applicants. I was surprised to find that several students from more "prestigious" institutions had little to no experience designing, implementing and carrying out experiments."

Another student remarked: "I think Senior Thesis is absolutely necessary for anyone planning to go on to graduate school. [Upon beginning graduate school] I soon found out that my research experience was beneficial to me in every class! Even if you are not doing research, it is very important to understand it and be able to evaluate it correctly. It has been obvious to me that because of our research experience, Southern students are depended on by other students to help explain statistics and research design."

When the Senior Thesis project became, in 1986, a capstone requirement for all majors, we allowed students to choose to produce either a literature review or an empirical research paper. Within five years, based on the faculty's assessment of students' projects and presentations, we decided to require empirical research from every student, because weaker students often chose the literature review option, when in reality, writing an effective literature review requires stronger analytical skills than conducting an empirical research project. Since that time, every session of senior thesis presentations has been assessed by the entire faculty, from the point of view of the faculty mentor and from the point of view of the faculty in the audience. Over the years, there has been considerable refinement in how we teach the Senior Thesis classes and how we direct students through the process. Now, almost universally, competent students produce good to excellent presentations. The faculty's ability to assess our students' presentations is enhanced by the undergraduate research conferences we attend, where we have the opportunity to compare our students to other students from the region. We are quite satisfied with the comparison.

We intend to continue to require all students to complete a senior thesis project for graduation. The faculty thinks the capstone experience is valuable for students, because it requires that they integrate their interests in particular areas of psychology with their writing, statistical analysis, public speaking and presentation skills. In addition, supervising Senior Thesis is a rewarding experience for faculty mentors.

Some of the most compelling evidence for the success of the program is that students, even those who were resistant to the experience, consistently report that the research experiences they gained from our program helped them feel better prepared for graduate school and work that involves writing. Even those students, who never attend graduate school, report receiving positive feedback from their supervisors about their ability to write reports for state human service agencies.

Further evidence for the effectiveness of the program in honing students' writing skills comes from data from surveys about the campus-wide Writing Program. The goals of the Writing Program include writing within the discipline and writing with confidence. Both of these goals are satisfied by our program. Data from surveys designed to assess the success of the Writing Program include appreciative responses from psychology students about the faculty who helped them with their writing skills.

There is evidence for our students' strong writing skills. Several students have been successful at publishing their Senior Thesis research in the *Journal of Psychological Inquiry* (including six empirical research studies and two "Special Features" publications) and in *Modern Psychological Studies* (including two empirical research studies). In addition, each year, several students present Experimental Psychology class projects and Senior Thesis projects at regional undergraduate conventions (Psychological and Educational Research in Kansas, Great Plains Students' Psychology Convention and Missouri Undergraduate Psychology Conference). Many of these projects receive presentation awards.

Finally, we think our students' research experience is a key variable in their admission to graduate programs and to their success in their initial graduate research classes. Results of alumni surveys showed that roughly 25% of our alumni are admitted to graduate schools within the year of graduation, and about 50% are admitted within five years of graduation. Many of our alumni who have pursued graduate studies have told us that their undergraduate research experiences were invaluable to their success in graduate school.

# University of Mary Washington: A Successful Departmental Model

**Roy Smith**

***University of Mary Washington***

This chapter describes a fully formed and integrated research program in an undergraduate psychology program at a liberal arts institution. The Mary Washington undergraduate research program evolved over 30 years, reaching its current stable form some dozen years ago (Bill, 1995). The program includes several courses, a symposium, and even an institutionalized *road trip* for senior participants. In addition to providing an extra-class introduction to the methods of psychology, the program unifies the department. Despite a large investment of time and resources, the department developed and sustained the program because it provides clear benefits for both faculty and undergraduate majors.

Although Mary Washington recently changed in status from a college to a university, the University of Mary Washington (UMW) Psychology Department remains an exclusively undergraduate enterprise. The size of the undergraduate liberal arts population has grown over three decades from 2,500 to 4,500, and the number of majors in psychology has kept pace, averaging 100 graduates each year over the past five years. Despite this growth, the core curriculum of the department has remained remarkably stable, allowing the steady evolution of our undergraduate research program. This stability, in turn, reflects the coherence of the department faculty and their commitment to teaching undergraduates. A core group of a half dozen or so faculty with tenures exceeding 20 years has maintained a long-standing commitment to developing our undergraduate research program. As we recruit, interview, and hire new faculty, we ask them to buy in to this model.

## Structure of the UMW Undergraduate Research Program

The core of the UMW undergraduate research program is a set of courses in methodology required of all majors. By design, our curriculum emphasizes the methods of psychology. All majors must complete four separate courses related to research methodology that comprise 15 of our 39 required hours. Approximately 30% of our majors take an additional four to six credits of a year-long team research project focused on a specific topic.

Our majors begin with an entry-level course, Psych 261 - Psychological Statistics and Research Methods. This four-credit course is comparable to the single course in statistics offered at many of our peer institutions. A pair of courses follow, which students may be take in either order, or simultaneously. Psych 360 - Advanced Statistics - is a three-credit course that builds on the basic course while focusing on classic methods for analyzing the results of true and quasi-experimental studies. The other member of the pair, Psych 362 - Applied Research Methods, focuses on the logic of non-experimental research and the preparation of an APA-style manuscript. Part of this four-credit course is the planning, executing, and reporting of a semester-long research project chosen by students. After completing these three classes, our majors have a solid grounding in statistics, methodology, and manuscript preparation.

For their fourth required course, students may choose one of several subject areas – Sensation and Perception, Cognitive Psychology, Physiological Psychology, Experimental Social Psychology, or Applied Behavioral Analysis – according to their interests. This set of courses shares several features. Each four-credit course includes both a lecture section and a laboratory section. Students, usually in small groups, select a research topic appropriate to the course, designing and running a semester-long research project. As in Applied Research Methods, each team produces an APA-style manuscript reporting its literature search, chosen methodology,

analysis of results, and discussion of the project.

This set of interlocking courses assures that every major will have the information and experience needed to complete an intense research experience if she or he chooses to undertake an independent study. Psychology 491 – Independent Study – is a four to six credit course spread across two semesters. In our model, students typically work in small groups, just as they have in their previous course work. These groups of two to six students meet with an individual faculty member throughout an academic year, designing, executing, and presenting a research project.

The UMW Psychology Department is unusual in devoting such a large part of the major course work to training all majors in research methodology. But the course work is not the entirety of the research program. Mary Washington has, for some time, required all its undergraduates to take at least two courses designated *speaking intensive*. The psychology department strongly supports this requirement, and we offer specific instruction in research presentation as part of the year-long independent study course. In the same way that we prepare students with a series of opportunities for practicing research skills, we provide a series of opportunities to present the results of that research. The major mechanism is a departmental research symposium held each Spring semester.

This symposium is a department-wide event. It is the major service project of our local chapter of Psi Chi, whose members coordinate the call for papers and the organization of presentations. Working with the department's student representatives under the guidance of the chair and the advisors of the Psi Chi chapter, this group of undergraduates also moderates the sessions, organizes breaks, and invites a keynote speaker from outside the department (Liss & McBride, 2004). Groups of students from each level of our methods courses make presentations. Initially students present the results of their projects for the Applied Research Methods course. They then have an opportunity to make a second improved presentation based on the research for their subject-based research course the next year. If students choose to take an independent study course, they present a third paper based on that research. By the time they complete the major, all students will have made formal presentations of their research to their peers and the faculty of the department. Although a substantial fraction of our majors continue to graduate school, only a few end up doing research and/or teaching for a living. Many more, even most, find themselves making public presentations, benefiting from the experiences of this undergraduate symposium.

## Beyond the Department

At about the time that our department laid down the course structure for the current major, our state psychological association significantly revised its structure. The Virginia Psychological Association (VPA) changed its status from a state lobbying arm for the practice directorate of the American Psychological Association to an umbrella organization for all psychologists in the Commonwealth of Virginia. One of the Academies that emerged from this restructuring was the Virginia Academy of Academic Psychologists (VAAP), which represents psychologists teaching in the colleges and universities of the Commonwealth. Members of the Mary Washington Psychology Department were, and continue to be, heavily involved in the academy. We have taken full advantage of VAAP's signature program, an annual research symposium specifically encouraging submissions by upper level undergraduate psychology majors from across the state.

As part of their research experience, those students who undertake a year-long research project agree to present the results of their research at the Spring VPA convention. Of course some students may also make presentations at regional and national conventions, but the VPA presentation is an integral part of our research program. Our independent study teams must submit a proposal early in the Spring semester and make their presentation late in that semester. To make this possible for all students taking independent study, the department underwrites the trip to the convention site, overnight lodging, and meals during the trip. The convention serves as much more than a presentation opportunity. On average, 30 to 40 students travel together to the convention hotel where they mix with their faculty mentors and with each other, supporting each other's presentations and learning from presenters from other schools. Our students see this event as a reward for their hard work during the year, and we encourage this perception. The trip is a memorable capstone experience for this group of graduating seniors.

## Lessons Learned

The undergraduate research program at Mary Washington, like those at each of the other institutions reviewed in this book, has its own peculiarities. Our program reflects the culture of the institution, the philosophies of the department members who support the program, and the unique history of the departmental effort. Nonetheless, we have learned some lessons, both practical and philosophical, over the past decades. Perhaps our lessons can be helpful to other departments that might want to begin an undergraduate research program or to upgrade their existing effort. The underlying theme of the lessons we have learned is that a good research program can not be an *add on* to the major or even a *capstone* experience. Federal funding has focused on gathering a few outstanding students from several institutions in extra-curricular programs (e.g., Page & Abramson, 2004). We believe that to extend the benefits of a strong undergraduate research program to more students, a department must commit to the integration of research into the fabric of the major. Full integration can be costly in terms of faculty time and financial resources, but we have learned that the benefits are well worth the commitment. Here, in no particular order, are four lessons we have learned.

### *An Integrated Program Generates Faculty Commitment*

One difficulty in supporting an extensive undergraduate research program is finding ways to motivate faculty. No matter how much we want to provide students with research opportunities, we have many demands on our time and resources. Despite an intellectual commitment to our program, convincing faculty to devote the time and energy semester after semester to provide research opportunities for large numbers of undergraduates, on top of a full teaching load and other service commitments proved difficult. We needed to integrate research fully into the faculty-teaching load as well as into the student curriculum. Integration came in stages. First, we gave faculty a chance to accumulate credits for supervising student research teams. These credits were based on the number of credit hours generated, and faculty could redeem them for a reduced teaching load after banking a sufficient number. Although this system presented an extra task for the chair who must track credits and fit the resulting course releases into the schedule, the result was what we hoped for. A varying group of faculty was willing to head research teams year after year, combining their efforts to support several dozen students in their research projects. Quite recently, with the support of the administration, we moved to crediting the direction of undergraduate research in real time. If a faculty member directs five or more students in a semester, she or he is allowed a one course reduction in teaching load for that same semester. This *pay as you go* system is so popular that some faculty are arranging the conditions of shorter leaves so that they can maintain their research teams throughout the year.

### *A Comprehensive Program Generates Funding and Institutional Support*

Not surprisingly, supporting a symposium and taking a large group of students to a conference is costly. As a result, our entire undergraduate research program requires a significant portion of our yearly department budget. Promising these activities to our majors required that we find a way to guarantee this funding. Three successive chairs have worked over a 20-year period to generate this support. We have been successful largely because the research program is, in fact, an integral part of our curriculum and represents the logical culmination of our core curriculum in research methodology. After several years of submitting requests for special funding for our Psi Chi Symposium, the administration agreed to increase our departmental operating budget to cover the basic costs of running that event. We still petition the institution each year for travel funds to take our senior research students to the VPA convention. As a department, we agreed to make securing these funds the first priority for all departmental travel requests. We agreed that taking all our independent study students to a local convention is a higher priority than taking a few students to a regional or national convention. The commitment of our faculty has been matched consistently by the commitment of the institution.

### *A Comprehensive Program Unifies Faculty*

When we first organized our current curriculum and set in place the pieces of our undergraduate research program, our department was considerably

smaller than it is today. Our department has grown with the institution, primarily by adding new members to the existing long-term faculty. Of course the discipline of psychology has also grown and evolved over the past decades. We have added new courses and dropped others from our offerings. We have not, however, experienced conflict over the direction of the major or even the nature of individual hirings. Perhaps this common outlook is just luck, but I suspect strongly that the constant commitment to our research program has much to do with our unity. One of the strong requirements for each new faculty member is an ability to help with the offerings that form preparation for research. When we added a course in applied research methods, we agreed in principle that any member of the department should be prepared to teach it. Commitment to our vision for undergraduate research is one of the explicit criteria for positions offered by the department. Far from being a disincentive, this requirement is a strong selling point for us. As an undergraduate department we have been unusually successful in hiring our first choice for new departmental positions.

### *A Strong Program Motivates and Rewards Students*

We are an undergraduate department with a strong focus on teaching. Even without the sort of undergraduate research program we have developed, I imagine our undergraduate majors would be heavily involved in departmental activities and become unusually loyal alumni. Each year our alumni attending graduate school or undertaking professional careers return to tell us of the impact we have had on their development. Two things stand out from their casual reports as well as from more formal periodic exit interviews with our seniors. First, they appreciate the preparation they have received in research methodology. Their report contrasts with reports that undergraduates find their courses in methods less valuable when they fill out classroom evaluations than they do when they have experienced graduate school (Johanson & Fried, 2002). Second, they appreciate the research experiences that allowed them to interact with their professors in settings outside the classroom. During their undergraduate coursework they are strongly motivated to perform well for the faculty who hear their presentations. If anything, they are evenly more strongly motivated to perform well before their peers. These informal reports are consistent with more formal assessments of the variables that support strong research training environments (Shivy, Worthington, Wallis, & Hogan, 2003). Our Psi Chi Symposium and our road trip to VPA are about the teams of students and faculty. The students look forward to these events all year – and not with dread! Because the program is graduated and cumulative, students are well prepared and have the experience of performing very well indeed. They find research to be the most rewarding thing they do as undergraduates.

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# A Successful Departmental Model: Furman University

**Charles L. Brewer, Gilles O. Einstein, & Beth A. Pontari**

***Furman University***

Located in Greenville, South Carolina, Furman University was founded in 1826. In the late 1950s, the university moved about eight miles from downtown Greenville to a beautiful 750-acre campus at the base of the Blue Ridge Mountains. Until 1992, Furman was closely associated with the South Carolina Baptist Convention. The university is now an independent, coeducational liberal arts college that is listed under the category called "Baccalaureate Colleges—Arts & Sciences" in the Carnegie Foundation classificatory scheme, and it ranks among the leading such colleges in the country. (Furman is called a university only because it has small Master's-degree programs in chemistry and education that enrolled a total of 49 students during the fall term of 2006-2007.) We have about 2,600 students who can major or minor in 28 academic departments. Of the 228 full-time and 46 part-time faculty members, 178 have attained tenure. Most students live on campus and are of traditional college age. "Furman emphasizes engaged learning, a problem-solving, project-oriented and research-based educational philosophy that encourages students to put into practice the theories and methods learned from texts and lectures" (Furman University Catalog 2006-2007, p. 4). The Department of Psychology embraces and practices this philosophy. With 10 full-time faculty members and 2 adjuncts, our department graduates about 37 majors each year. Many of our graduates pursue advanced work in highly respected universities throughout the country, and many of them have distinguished themselves in a wide variety of vocations.

## Independent Research, Summer Research, and Special Topics Courses

Research has been an important component of our curriculum since the 1960s. We believe that involving undergraduates in the process of inquiry and discovery is the essence of liberal arts education. We accomplish this goal in two key ways. About 12 years ago, during one of our annual retreats, psychology faculty members committed themselves to providing top-quality research experiences for all interested students. Toward that end, we began to encourage more students to take our elective 4-hour Independent Research course that requires them to propose and conduct an original research project. Also, we enriched our summer research program. Students chosen for the summer program spend 10 weeks of full-time collaboration with a faculty member on a project of mutual interest. In addition to students who conduct summer research at Furman, several students have worked with highly respected research psychologists at other institutions in the United States, Canada, Europe, and Japan. Both the Independent Research course and the summer program allow students to participate fully in the research—conceptualization, design, data collection, data analysis, and manuscript preparation. Because we do not permit students in the summer program to take academic courses or have other jobs, this 10-week period provides undistracted time for students and less distracted time for their faculty collaborators. Another benefit of the summer program is that no grades are given, so students are more likely to learn for the sheer joy of knowing. These characteristics foster a climate that promotes excitement, creativity, critical thinking, diligence, and independence.

Several years ago, we began to develop a series of seminars called Special Topics courses, each of which provides 4 hours of academic credit. In a typical seminar, a small number of advanced students read and discuss primary literature in a particular area (e.g., Self, Language Development, Psychoneuro-immunology, and Psychopathic Personality). Modeled after graduate-school seminars, these courses encourage students to develop a familiarity with the literature in a particular area that sometimes leads to an Independent Research project for credit or to a summer research project.

These Independent Research projects, summer research projects, and Special Topics courses help to foster and maintain enthusiasm for learning that is

unusual in traditional classroom instruction. Sometimes a faculty member will have three or more summer research students who become a highly productive research group. These academic approaches increase students' confidence in their ability to learn and work independently and collaboratively, and they promote the development of specific skills. Students learn to apply methods and theories from the classroom to their own projects. We consider these activities to be ideal capstone experiences, as recommended by the St. Mary's Conference on Undergraduate Education in Psychology (see Brewer et al., 1993) and in the *APA Guidelines for the Undergraduate Psychology Major* (American Psychological Association, 2007). We believe that problem-solving skills learned in these settings provide ideal preparation for lifelong learning. Hence, we encourage research for all of our students and not just for those who are thinking about going to graduate school or pursuing careers in psychology. Of approximately 37 psychology majors who graduate each year, about 20 of them are involved in summer research. Regardless of the nature of the project, students contribute to all phases of the research, and they usually have significant ownership of the project. Most of these research experiences result in conference presentations, and some lead to publications in prestigious journals.

## Funding the Summer Program

Through the competitive Furman Advantage Program, we pay nearly all of our summer research students $3,000 for the 10-week period, whether they conduct research on campus or elsewhere. Students who go to other universities receive additional money to cover travel expenses. The rest of the funding comes through the creativity and resourcefulness of students and faculty. Several faculty members have research grants, and we are aggressive in seeking funds from organizations that support undergraduate research. Finding funding is a major challenge every year, but we always manage to do so.

## Internship Program

In addition to the research activities discussed earlier, our department has an extensive internship program that encourages students to secure internships that match their interests and career goals. For instance, many students intern in the mental health field, but many others obtain positions in organizations concerned with advertising, business, human resources, assessment, and so on. Students have several options for internships. They may take a regular course (Internship) for 2- or 4-hours credit, and they may arrange noncredit internships during the regular academic year or in the summer. Our summer program provides a strong incentive for employers. Working in this program, a student can offer to work for half of the normal wages, because Furman will pay the other half. As a result, students obtain outstanding internships with agencies in South Carolina, in numerous other states, and in other countries such as Africa, Scotland, and Switzerland. We require students who take Internship for credit to write a major manuscript, and that is why we mention these experiences in this chapter on research in our department.

## Psychology Research and Internship Forum

Considering the number of students involved as well as the high quality of their research and internships, we wanted to create an occasion for students to share their experiences with each other, faculty members, administrators, and the broader Furman community. In the spring of 2003, our department organized the first Psychology Research and Internship Forum. Modeled after a professional research conference and comprised only of student participants, the 3-hour afternoon program included research talks, a poster session, and an internship panel. In concurrent talk sessions, six students presented research they had conduced as an Independent Research project or as part of our summer research program. These talks were similar in level and type to what you would expect to find at a professional conference. Twelve students presented their research in a 1-hour poster session, and six students discussed their internships as panelists in one session.

To underscore the importance of this event and to encourage student attendance, the psychology faculty suspended afternoon classes for that day and required their students to attend the Forum. Furthermore, we sent individual invitations to Furman administrators and local alumni to encourage attendance. Consequently, each talk session had at least 40 attendees, and many of them generated lively discussion with the student presenters. The poster session was also crowded, and student presenters had the opportunity to talk more informally about their research. Internship panelists spoke about how internships allowed them to see firsthand how concepts and principles from the classroom apply in the real world, as well as provided them with career-related guidance. The first Forum was a smashing success. Student participants were excited about

sharing their accomplishments and experiences with peers and faculty, and they were delighted and reinforced by the enthusiasm of Forum attendees.

The Forum has grown dramatically since its first year. Recognizing the value of our Forum, the Sociology and Political Science Departments participated in the third annual conference. Last year (the fourth year of the conference), what was initially the Psychology Research and Internship Forum became the Social Science Research and Internship Conference that included student participants from seven departments. The program consisted of 19 symposia in which 102 students presented their research, 4 panel discussions that featured 19 students sharing their internship experiences, and 3 separate poster sessions that highlighted the research of 74 students. Several hundred people attended the Conference, including students, faculty, administrators, and community members.

This Conference has become an important tradition in Furman's Psychology Department, and students look forward to participating. The Conference provides them an opportunity to hone their presentation skills while sharing the products of their hard work. Finally, and perhaps most important, the Conference shows new and prospective psychology majors the number and diversity of extraordinary opportunities available to them.

We are proud of our department's long tradition of research and internships, and we cherish the benefits that students derive from these important aspects of their undergraduate education. We hope that this venerable tradition will live long and prosper.

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# A Comprehensive Strategy to Promote Undergraduate Research at the University of Central Arkansas

**William J. Lammers**

***University of Central Arkansas***

The University of Central Arkansas is a regional, comprehensive, public university situated about 30 miles north of Little Rock. The University is located in the city of Conway with a population of 55,000. The University enrolls approximately 10,500 undergraduate students and 1,500 graduate students. Most undergraduate students reside on or near campus and most are traditional college age. The six colleges offer bachelor's degrees in 56 different areas, master's degrees in 32 areas, and doctoral degrees in four areas. The university employs 450 full-time instructional faculty and 180 part-time instructional faculty. The Carnegie Foundation classifies the University as a Master's/L institution. The Department of Psychology & Counseling has 21 full-time faculty and 360 undergraduate majors. During the past 15 years or so we have engaged in strategic efforts to promote undergraduate research. Some of the strategies involve new initiatives and others involve revisions to current practices. The different areas in which we have mechanisms to promote undergraduate research include advising, curriculum, travel to conferences, recognition, financial support, and department atmosphere.

## Advising

### *Psi Chi National Honor Society and Psychology Club*

Our department maintains an active chapter of the Psi Chi National Honor Society that holds meetings in conjunction with the Psychology Club. The faculty advisor encourages officers to schedule several meeting topics that involve discussion of research. Topics include presentation of a faculty member's research, an overview of faculty research in the department, announcements regarding opportunities to assist faculty with their research, discussion of the value of undergraduate research for getting into and being successful in graduate school, and discussion of research-related careers in psychology. Although we have not done so yet, having students who have conducted research present their findings at these meetings would be interesting.

### *Freudian S.L.I.P.S.*

For about 15 years, our department has invited psychology majors with the highest academic credentials to join a special advising group called the Freudian S.L.I.P.S. (Searching for Life In a Ph.D. School) See Lammers (2001) for a detailed description. This informal seminar group of approximately 20 students meets with a faculty mentor twice a month during the spring and fall semesters to discuss all aspects of getting into quality graduate programs. Beginning in their freshman year, faculty encourage these students to get involved in research, attend conferences, present research at conferences, and submit research for publication. We clearly articulate the benefits of these actions. Having the best freshman majors work as research assistants for faculty is not unusual nor is students' attendance and presentation of research the following year at conferences.

The faculty in our department are very aware of this group of students and know that they are an excellent source of quality research assistants. When these students express an interest in getting involved in research, a faculty mentor e-mails all other faculty in search of a placement. When our faculty are looking for an undergraduate student to work as a research assistant or to direct a project, they will routinely contact the S.L.I.P.S. faculty mentor, who then arranges meetings between the faculty member and student candidates. Such a system provides the proverbial win-win situation for faculty and students.

## Curriculum

### *General Psychology course*

As do faculty in many psychology departments, we use our introductory course as a primary research participant pool. A syllabi for every section of the

General Psychology course contains a description similar to the following:

*Enrichment Activities*: To encourage you to experience psychology beyond the textbook and the classroom, 5% of your grade will be based on the completion of two "enrichment activities" (each worth 2.5%). You may choose which enrichment activities to complete from the following:

*Participation in psychological research*: Much of our knowledge of human behavior and mental processes is based on people who volunteer to participate in psychological research. Help a psychologist and experience what it is like to be a subject in a psychology experiment. All scheduling of psychology experiments is handled over the Internet. To sign up for a study, go to: http://experimetrix.com/uca. Psychology experiments are worth "credits." Each credit is equal to 1 enrichment activity. Important: If you miss a scheduled experiment, you will receive a penalty equal to the credit value of the experiment. You must make up the penalty (by completing an equivalent enrichment activity) before completing the rest of your enrichment activity requirement. For example, if you have not completed any enrichment activities and receive 1 penalty, you must now complete 2 enrichment activities; the first will remove the penalty (but is worth no credit), whereas the second and third (worth 2.5% each) will complete the requirement. However, if you cancel at least one hour prior to the experiment, you will be removed from the schedule and not penalized. Also, if you show up but decide not to participate, you will not be penalized. All psychological research has been reviewed and approved by the UCA Institutional Review Board to ensure the rights of participants. Participation is voluntary. If at any time during a study you wish to discontinue participation, you may do so without penalty. All data you provide will be confidential. Before completing any study, you must consent to participate based on information regarding the procedures and risks of the study. All studies will involve little or no risk of psychological or physical harm. (*Note: Alternative activities are then described that can also be used to meet the enrichment activities requirement*.)

Such a policy has several benefits. First, undergraduate students who are conducting research have a readily available participant pool. Second, most of our psychology majors and minors get direct exposure to psychological research very early in their academic careers. As noted in the description above, our department subscribes to an online service for the recruitment of research participants. The service includes posting of research opportunities, easy sign-up procedures, and automated e-mail reminders prior to testing sessions. This system facilitates several steps in the research process for everyone who conducts research in our department, including our undergraduate student researchers.

## *Research Methods course*

Similar to many psychology programs, ours requires a research methods course subsequent to a statistics course. A substantial portion of the methods course requires that each student develop a formal research proposal in APA format. Near the end of this course, the instructor encourages students to consider taking the Independent Research course to conduct their study.

## *Research Methods Laboratory course*

Psychology departments use different models to teach the statistics/methods/lab sequence, and there is significant variability in how departments incorporate the lab component into the curriculum. Various models include the lab component as part of the methods course, the lab component as a separate 1-hour course taken concurrently with the methods course, the lab component as a separate 1-hour course taken subsequent to the methods course, and the lab component as a separate 3-hour course taken subsequent to the methods course. Fifteen years ago, our department decided to enhance the research experience of our undergraduates by increasing the lab component from a 1-hour course subsequent to the methods course to a 3-hour course subsequent to the methods course. This change had a very positive impact on the quantity and quality of the research experience for our students. Because of the increase in contact time, lab students routinely conduct quality research that they present at state and regional conferences. We have had several students submit their manuscripts for publication, and a few of them have published in student research journals. Recently, we have made efforts to encourage more students to present and publish their work.

The specific format for our Research Methods Laboratory course varies to some degree across instructors, but I will describe my approach. The lab class meets in a classroom with 20 networked computers containing research design and statistical analysis software. This technology creates opportunities for students to conduct cutting-edge research with precise control. Students work in groups of three to undertake all steps in the research process, including topic development, literature gathering and review, formulation of hypotheses, research design, ethics approval, participant sign-up,

data collection, data entry, data analysis and interpretation, and dissemination of findings.

The dissemination takes three forms. Students prepare a complete APA research manuscript, present their study in a poster session, and make an oral presentation using PowerPoint. During spring semesters, I have also asked all of the students to present their research at a state conference for psychology students (ASPS-Arkansas Symposium for Psychology Students). Although this experience creates some degree of anxiety, students' sense of accomplishment after their presentations is very rewarding. Finally, I encourage those students with excellent research projects to present their research at a regional conference (SWPA-Southwestern Psychological Association) and to submit their manuscript for publication to a student journal (e.g., *Journal of Psychological Inquiry* (*JPI*) and the *Psi Chi Journal for Undergraduate Research* (*PCJUR*)).

### *Independent Readings course*

The departmental curriculum includes an Independent Readings course that students can take for one, two, or three credit hours. Students identify a topic they would like to explore and seek a faculty member to serve as their mentors on the project. The mentor and student arrange a meeting schedule and develop a set of objectives. Sometimes the primary objective involves a comprehensive literature review manuscript. More often, the primary objective is a complete research proposal that will serve as a prelude to the student conducting independent research. The course provides a valuable opportunity for students to explore an area that fascinates them, to experience one-on-one mentoring relationships, and to prepare to conduct independent research.

### *Independent Research course*

The Independent Research course often follows student completion of Independent Readings. Students can take the Independent Research course for one, two, or three credit hours, and the course is structured very similar to the Independent Readings course, including one-on-one mentoring. The course's primary objective is successful completion of a research project and associated research manuscript. As with other student research projects, faculty encourage students to present their research at conferences and, if appropriate, submit manuscripts for publication. As an alternative to the above format, students can take Independent Research to receive course credit for serving as a research assistant on a faculty research project. Student's degree of involvement corresponds to the number of credit hours taken.

## Undergraduate Scholar Program

Our students have the opportunity to receive the distinction of Undergraduate Scholar in Psychology by completing an undergraduate honors thesis. The usual sequence of events involves students taking Independent Readings to develop a research proposal, presenting their proposal to a departmental committee for approval, taking Independent Research to conduct the study, and presenting their final research manuscript to a departmental committee for approval. The faculty designate students who are successful as an Undergraduate Scholar in Psychology in the graduation booklet and on their diploma. We encourage these students, in particular, to present their research at conferences and to submit their manuscripts for publication.

## Travel to Conferences

For about 15 years, department faculty have encouraged and coordinated student travel to at least two conferences a year, most notably the ASPS and SWPA conferences. We notify students about these conferences and encourage them to attend and make presentations. Faculty help coordinate travel arrangements for students, and the department provides financial assistance. Our department is committed to providing at least some financial assistance to each student and often pays all expenses for students who present their research at conferences. Faculty who accompany the students make an effort to introduce students to the events and opportunities available. Students who attend these conferences often become motivated to conduct their own research and to make conference presentations the following year.

## Recognition

Our department is developing strategies to provide more public recognition of our undergraduates who conduct and present research. At the end of each semester, students display their research posters in hallways near the department office and classrooms. We are making efforts to take photos of students at conferences, students with their posters, and students making oral presentations. There will be displays of these photos on a bulletin board and on the department Website. We currently display student publications in a wall case in the

department and plan to highlight such accomplishments on the department website.

## Financial Support

The University of Central Arkansas provides financial support for undergraduate research at three levels. At the university level, the Sponsored Programs Office maintains a student research fund to which students can apply for money to support their research. This office also encourages and coordinates student proposals for state undergraduate research fellowships. The Arkansas SURF (Student Undergraduate Research Fellowship) awards support both students and faculty mentors for their research efforts.

At the college level, the dean maintains a pool of money to support undergraduate research. The dean provides a percentage of matching funds for students who apply to the university's student research fund. In addition, the dean recently provided support for the ASPS conference that our department sponsored.

At the department level, faculty in general and the department chairperson in particular continue to support the use of departmental funds for undergraduate research. As already noted, the department provides significant funds for students to travel to conferences and is extremely supportive of students who present their research at the regional conference. In addition, students can request funds from the department to support research projects that may involve modest expenses. For student projects that are more expensive, the department supports a percentage of matching funds for students who apply to the university's student research fund. Like our dean, the department chairperson recently provided support for the ASPS that we sponsored.

## Department Atmosphere

Clearly, our department encourages and supports undergraduate research. However, this achievement did not happen by accident and requires a certain level of vigilance to maintain. The department chairperson provides leadership and incentives, and a core group of dedicated faculty continue to extol the values of undergraduate research to students and other faculty. This process occurs even before hiring faculty. We ask applicants for full-time faculty positions about their attitude toward involvement of undergraduates in research and their willingness to mentor such students. We remind current faculty that high quality undergraduates are ready and willing to be research assistants. We encourage faculty to mentor undergraduates in Independent Readings and Independent Research and to promote the undergraduate scholar program. The department chairperson supports such mentoring when scheduling teaching loads.

Faculty involvement in undergraduate research extends beyond the walls of the department. Faculty serve in such roles as Associate Editor for *JPI*, reviewer for *JPI*, Associate Editor for the *PCJUR*, President of SWPA, State Representative of SWPA, and host for the ASPS conference. An atmosphere that includes faculty who value, encourage, and promote undergraduate research is critical to student engagement in research. Student research will simply not happen without it.

## Summary

Where there are dedicated and proactive faculty, there will be student research. However, for student research to extend beyond the relatively few students who work with those faculty, a more comprehensive departmental strategy is crucial. As with our department, the strategy may include creative advising practices, a system for mentoring relationships, curricular opportunities and incentives, availability of research participants, organization and financial support for travel to conferences, mechanisms for recognition of student research, financial support for student research, and support for faculty who mentor students. Efforts to implement such a strategy are rewarded by the students' enhanced educational experiences and accomplishments.

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# Section 3. Conducting Undergraduate Research

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# Involving Freshmen in Undergraduate Research

**Emily Balcetis**

***Ohio University***

**Richard L. Miller**

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The 1980's ushered in a paradigm shift, altering our perception of what factors constitute excellence in post-secondary education (Kojatic & Kuh, 2001). Previously, many academics thought that the quality of education provided by an institution of higher learning was inextricably linked to institutional resources and reputation. However, the *Involvement in Learning Study* (The Study Group on the Conditions of Excellence in Higher Education, 1984) challenged this view by suggesting that the quality of education is directly linked to good educational practices that stimulate student engagement (Astin, 1993; Kuh, Pace & Vesper, 1997; Pascarella et al., 2006). Student engagement enhances the development of critical thinking skills (Pascarella, Palmer, Moye, & Pierson, 2001), as well as openness to diversity and challenge (Pascarella et al., 2006).

A number of practices in undergraduate education can promote student engagement, and include student-faculty contact (Anaya, 1999; Avalos, 1996), cooperation among students (Cabrera, et al., 2002), active learning (Kuh et al., 1997), prompt faculty feedback to students (Feldman, 1997), and exerted academic effort (Astin, 1993; Hagedorn, Siadat, Nora, & Pascarella, 1997). One way to integrate these practices is to involve undergraduate students in research. At many schools, this is accomplished through courses in research methods (Grover & Weaver, this book), advanced lab courses (Wozniak, this book), independent study (Burns, this book), and capstone experiences (Schwartz, this book). All of these experiences are primarily available to upper-division students. In this chapter, we will explore the possibility of providing these same experiences much sooner in the undergraduate student's program of study.

Recent inquiries have demonstrated that the first year of university or college maintains a critical influence over long-term student retention (Blythman & Orr, 2003; Trotter & Roberts, 2006). Given the importance of the first-year experience in retaining students throughout a post-high school education in its entirety, our goal is to explore one factor that can improve the first-year experience. In particular, we will discuss how small group research can serve this goal. Instructors concur that small group learning contributes to retention (Taylor & Bedford, 2004) because the quality and intensity of student engagement with such university experiences improve student outcomes (National Survey of Student Engagement, 2001). In particular, Demoret and Miller (2007) have shown that involvement in undergraduate research is significantly more engaging than attending ordinary lecture and/or discussion classes. Throughout this paper, we will discuss how small group learning can be implemented in research labs and the specific benefits of small group research that contribute to engagement. In addition, we will discuss the problems that arise during small group research and provide suggestions for how to avoid these common pitfalls.

## Designing a Research Program for Freshmen

Ten years ago Emily Balcetis was a freshman honors student enrolled in introductory psychology, and I (Rick Miller) taught a social psychology course for juniors and seniors that included a lab component (see Wozniak, this book). It occurred to me that it might be fun to invite the honors students to join the seniors in my lab. Emily was the only student to avail herself of my offer and she and a senior conducted a study on cognitive wayfinding that was published in the *Psi Chi Journal of Undergraduate Research* (Balcetis & Linder, 1998). Based on this positive experience, I repeated my offer most recently by inviting all of the students in an honors section of introductory psychology that I taught to conduct research. In this experience, I invited senior psychology majors to pair with my honors students, who were mostly non-majors, in conducting an independent research project, chosen by the students. All of those eight projects were presented at a regional conference and one has been published in a student journal. Currently at UNK, we have a formal program, the Freshman Apprenticeship Program that seeks to involve first-term freshmen in collaborative research projects with faculty. Our program is similar to a number of other programs at colleges and universities around the country that seek to promote

student engagement through collaborative undergraduate research. In recruiting freshmen into such programs, many schools target particular types of students, including those admitted into honors programs, those who are at risk, those who are from under underrepresented groups, or those with clearly defined career goals.

The University of Wisconsin-Eau Claire's Blugold Fellowship program (see Lind, this book) provides twenty incoming freshmen with the opportunity to work about five hours a week as assistants to faculty engaged in ongoing research. Students receive a $1000 scholarship and a $1200 stipend, which is renewable in their sophomore year. Interestingly, the funds for this program are provided out of student fees voted upon by the students.

The University of Missouri's EXPRESS Program (Exposure to Research for Science Students) is specially designed for freshmen who are from ethnic groups underrepresented in the sciences. This program provides an hourly wage for students who work 8-12 hours a week in collaboration with a faculty mentor. The program also provides a variety of supplemental activities, including weekly workshops on such topics as: how to study, preparing for graduate school, and career options in the sciences. Students who are eligible for work-study funds can apply that eligibility to the EXPRESS program.

Utah State University (see Kinkead, this book) has a "Research Fellows" program that provides a $1000 stipend for students selected to work on a research project with a faculty mentor. This program is for highly focused students who come to school with a clear sense of what they want to accomplish. Selection is based on an essay and educational and career goals and an interview with the Council of Associate Deans who match the students with active researchers. Several schools have implemented summer research programs for freshmen. The Honors College at Virginia Commonwealth University has two programs. The first is a research institute that introduces new students to research concepts and methods from a multidisciplinary perspective. The objective of this program is to foster an academic culture where students actively develop skills and learn the value of conducting research early in their college careers. The second is a program that provides the opportunity to work collaboratively with faculty on a research project. In addition, seminars are conducted that teach computer technology skills, research and writing skills, and strategies for academic and career success.

Similarly, the College of Natural and Agricultural Sciences at the University of California-Riverside has a program called CNAS Scholars Summer Research Internship. In this program freshmen participate in an 8-week paid summer research internship. This program is considered a full time, 40-hours/week job, although the exact schedule is left to the faculty mentor to work out. The program also has a weekly luncheon with the College Dean where the students discuss their research with other students who are also working in the program. A report of the results of the research is required at the end of the summer, and students typically present their research at a conference.

The Research Apprenticeship Program at the University of Nebraska at Kearney provides opportunities and funding for incoming freshmen and their faculty mentors to engage in a wide-range of research activities. Selection for participation is based, in part, on an essay that answers such questions: What would you choose do if you have earned your university degree and have the opportunity to design and market a new product, solve a great mystery of the universe, or find a solution to a significant social challenge, and describe why? Often, the freshmen chosen for this program join a research team that includes upper-division students, which provides additional learning experiences and peer mentoring for the freshman. Each of these programs employs features that you may find valuable in setting up a similar opportunity at your college or university.

## Benefits of Small Group Research for Freshmen Students

Freshmen students can benefit from such research experiences in several ways: gaining in-depth knowledge in their chosen field early in their academic career, building strong connections to faculty, becoming better prepared for graduate school, gaining confidence and experience, improving their writing and presentation skills, creating a sense of professional identity, as well as engaging in activities that are intellectually stimulating.

### *Educational Gains*

One of the most obvious benefits is the educational gain that working in a research lab provides for the Freshmen, especially when paired with more advanced students. For example, group learning enhances reasoning and higher order thinking (Blumenfeld, Marx, Soloway, & Krajak, 1996). Given the personal responsibility that must be assumed by members of a research collaborative, group work promotes deeper cognitive processing

through rehearsing, organizing, and integrating information. When students connect and integrate ideas, elaboration is needed (Blumenfeld, et al., 1996). Within the group setting, students are required to articulate to others what they know and have learned. Advanced students can model this behavior for the Freshman who in turn can demonstrate their developing skills. In addition, students learn to address probing questions and to withstand challenges to their thought process, which are sometimes more easily coped with when the challenges are from other students, rather than the professor. Successfully participating in this type of interaction strengthens and verifies students' personal knowledge.

### *Social and Personal Development*

In addition to the educational gains of small group research, students also experience personal growth. Small group research fosters a sense of identity and belonging (Jacques, 2000), which is an important factor in student retention (Gardner & Jewler, 1992). This sense of belonging is particularly important for first year students who are experiencing several changes in their lives. From our experience using small group research, we have found that such opportunities allow students to develop interpersonal skills through collaborative problem solving, in addition to presentational and communication skills. These broad skills that cannot be developed in isolation but that require feedback and interaction with others are ones that are beneficial outside of the particular research project in which the student is engaged.

Finally, small group research confers benefits to social development (see Blumenfeld et al., 1996). In particular, students are required to develop and use perspective-taking strategies in order to develop a project that reflects the combined interests and efforts of all group members. In doing so, students learn how to accommodate others' ideas, how to adapt the divergent perspectives of each group member in order to produce a cohesive project. Beyond this benefit, students learn acceptance of others. Students develop tolerance for divergent opinions and diverse styles of working, skills that will be beneficial during the remainder of their college experience and beyond.

## How to Optimize the Benefits

### *Suggestions for group formation*

Our primary suggestion for instructors interested in implementing small group research that involves freshmen is to use a *peer-scaffolding* approach. Within this paradigm, novice students are paired with relatively more expert partners to accomplish a single goal such as developing and conducting an experiment. Pairing students with different levels of experience is beneficial for both partners. Novice researchers develop beneficial learning styles within the project, which are likely to persist after the project ends (Lai & Law, 2006). Second, we suggest instructors assist students in determining or assuming a specific role in the group. Assisting group members' decisions regarding roles will reduce the possibility that a sense of personal responsibility will be diffused. In addition, roles increase perceived group efficiency (Strijbos, Martens, Jochems, & Broers, 2007) thereby making satisfaction with the group experience more likely.

Third, we suggest that group membership be diverse rather than homogeneous. Consider having students work with others who they do not know and avoid forming partnerships with close friends, romantic partners, or selecting a group based solely on gender. The benefits of diverse group membership are clear. Increasing diversity in the group can lead to more effective groups when measuring final project grades and group cohesion (Lee & Farh, 2004).

### *Suggestions for project creation*

We suggest structuring the research project in a way that maximizes students' sense of independence. As an instructor, it is important to keep the research questions that students explore open-ended so that they might independently develop the specific empirical hypothesis. The answers to the research question need to be unknown. In other words, the strategies, paradigms, and approaches that will be used to answer the empirical question will be determined as a part of the research process. Allowing students to freely develop their interest and their approach will improve group and personal satisfaction with the research experience

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## Problems that Arise in Small Group Research

Simply placing students into groups does not guarantee quality collaboration (Soller, 2001). In fact, the problems that arise during group work often leave instructors wary about implementing group work in the future and students nervous and uncomfortable about participating in such a project. In one case, when given the choice, 79% of students wanted to participate in a group "real world" marketing research project rather than complete a similar one alone

(Ryan & Ogilvie, 2005). Unfortunately, only 52% maintained this preference by the end of the semester-long experience. Interestingly this preference shift is in large part attributed to logistical problems in working with others. Given the appealing nature of group work for both instructors and students (at least initially), we will discuss common problems in the freshmen/senior collaboration and offer some specific strategies that might be employed to address problems.

## *Social loafing*

Although a potentially profitable experience, the benefits of group work decrease when the distribution of work within groups is unfair (Karau & Williams, 2001; Liden, Wayne, Jaworski, & Bennett, 2004). Social loafing, or the tendency for members to offer less effort when working with others, predictably occurs under the following circumstances. Loafing increases as group size increases (Latané, 1981) and when the potential for personal evaluation is reduced (Kerr & Bruun, 1993; Williams, Harkins & Latané, 1981). In addition, it is tempting for Freshmen to defer to more advanced level students.

In order to decrease the likelihood that social loafing will occur in group research, we suggest limiting the number of people involved in a single project. In addition, we suggest increasing the sense of personal accountability to reduce the likelihood of social loafing (Slavin, 1990). We suggest having members present different aspects of the project to the larger class each time the class meets. Importantly, group members should vary what aspects they are responsible for presenting from week to week. Giving the Freshman students reasonably challenging tasks that can be accomplished within their level of skill is a good way to ensure full participation. Also, allowing group members to evaluate each other's contributions promotes a sense of fair play within the group. Finally, instructors might consider having an end of term presentation that is co-delivered by all group members.

## *Poor time management*

Certainly, it is well recognized that individuals are unrealistically optimistic when predicting how quickly they will meet a deadline or accomplish a task. For Freshmen, coming straight from the high school experience, the more stringent time lines required in college can be unexpected. Unfortunately, the unjustly optimistic timeline developed for one's own goals extends to predictions that groups make about their timelines as well (Buehler, Messervey, & Griffin, 2005). In fact, the inability to meet deadlines is more pronounced after group discussion of timelines than after individual consideration. These mis-estimations occur in group discussions because members tend to focus on factors promoting successful task completion and do not spend enough time considering the potential problems, which leads to an overly optimistic outlook. The end product is that group work may in fact be procrastinated to a greater degree than had the project been completed by an individual.

To reduce the likelihood that time management issues arise, we highlight the importance of providing structure as efficient interaction does not just happen, but rather must be intentionally designed (Soller, 2001). To avoid the potentially harmful planning fallacy, we suggest having groups not only plan for success but also establish contingency plans in case short-term deadlines are not met. Groups might brainstorm a timeline for successful completion, but also predict the pitfalls along the way.

## *Negative Social Outcomes*

Although small group research can confer social and developmental benefits, pairing novice and relatively expert researchers might create negative social outcomes. For instance, novice students might be socially stigmatized (Blumenfeld et al., 1996). When novice and more senior students are matched, status differences can be exacerbated (Blumenfeld et al.). Novice students may be more timid in the presence of an older, more experienced student and feel inhibited about voicing their opinions (Crozier, 2004). Their lack of participation then may be an additional source of stigmatization or frustration to other members of the group.

We suggest offering a variety of venues for discussion outside of the classroom to reduce the inhibition that often prevents shy students from contributing. We have used internet blogs as a way to foster contributions from students sensitive to power differentials. This forum encourages continued debate between group members and between research teams. Students develop writing and critical thinking skills while providing an increased sense of anonymity and decreased feelings of anxiety given the lack of urgency or time constraint for offering a contribution. Additionally, students receive feedback from multiple sources while feeling a part of a larger scientific and intellectual community from the safety of their own home. Increasing variety in presentational outlets provides students with different avenues by which they might develop the communication skills and the personal knowledge

that they need in order to feel comfortable as a full group member.

## Questions to Ask When Creating a Program

In creating a freshmen research experience, there are a number of options and several questions that should be addressed. First, which students are to be provided with the opportunity: honors students, students at risk, or anyone showing an early interest in research? Second, what form should the program take: Spring semester, when the students have adjusted to the campus environment, full academic year beginning in the Fall, or summer only? Third, what funding sources are available to support the program: grant overhead, student fees, re-allocated internal funds, external grants? Fourth, in addition to collaborative research, what other activities do you want to provide to the freshmen: seminars, workshops, regular team meetings, and opportunities to meet with administrators? Fifth, how will you disseminate and showcase the students' accomplishments: conference presentations, student research journal, on-campus student research day, and posters on the hill? Sixth, what incentives are available to faculty to encourage their participation in the program: stipends, course release, credit towards promotion and tenure? Seventh, how will you assess the value and success of the program, and what measures are likely to show differences between those who are enrolled in the program and those who are not: student engagement, retention, achievement, aspirations? Finally, what opportunities exist on your campus and community that lend themselves to research activities conducted by freshmen? Many of these issues have been addressed elsewhere in this book, and we encourage you to read about how others have answered these questions.

## Summary

The first year experience for undergraduate students serves as a foundation for the years of university education that will follow. In this chapter, we presented a strategy for improving that first year experience—engaging the students in conducting empirical research. We discussed a number of roles students can assume and approaches faculty can take to improve the quality of the first year experience by involvement in research. Although the approaches are plentiful, it is important to create ways of integrating freshmen into the research enterprise that takes advantage of the students' and the other group members' strengths while minimizing costs. In this chapter, we described the educational, social, and developmental gains that can be bestowed upon both novice and more seasoned undergraduates when freshmen are involved in research. In addition, we suggested some strategies to assist in optimizing these benefits including attention to the process of research group formation, and project selection. In doing so, we additionally highlighted some potential problems one may encounter when novice students become involved in research including social loafing, time management concerns, and social costs. With attention to and consideration of these issues, we believe that a program committed to undergraduate research can create a positive environment that benefits both students and faculty.

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# After Introductory Psychology: The Next Course Preparing Psychology Freshmen and Sophomores for Undergraduate Research[1]

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## The Problem: Students' Misconception of Psychology as a Science

In *How to Think Straight about Psychology*, Stanovich (2007) bemoans psychology's image problem that stems from the way psychology is depicted in the popular culture. Between the rows upon rows of ineffective self help books, to almost 2 million parapsychology web sites[2] and media figures like Dr. Laura and Dr. Phil representing the discipline, it is hard to see how anyone can hold a view of psychology as anything but a frivolous pseudoscience. Faculty members teaching undergraduate psychology courses bear the challenge helping psychology students' overcome their conceptual confusion about the nature and foundation of the discipline. It is psychology faculty's obligation to teach not only the discipline's theories and findings, but its scientific foundation as well (Friedrich, 1996; Shaffer, 1977). As Charles L. Brewer (1993, p. 169) noted in discussing the undergraduate psychology curriculum, "The fundamental goal of education in psychology, from which all other others follow, is to teach students to think as scientists about behavior."

The unscientific image of the discipline is difficult to shake in even the best students not simply because of the tremendous impact of media and popular culture, but also because of students' own implicit theories (Amsel, Frost, Johnston, submitted; Stanovich, 2007). These implicit theories, often called folk theories (D'Andrade, 1987; Premack & Woodruff, 1978; Wimmer & Perner, 1983), have a core set of explanatory concepts and causal mechanisms that are antithetical to viewing any inquiry into mind as a rigorous science. In the words of the philosopher Daniel Dennett (1971), folk psychology is based on *intentional explanations* (i.e., explaining the behavior of a system by appeal to its beliefs and desires) that are convenient and even effective, but not terribly rigorous or scientific accounts of behavior. This perception is in contrast to scientific psychology, which is decidedly rigorous and scientific. Again in the language of Dennett (1971), scientific psychology encompasses *design explanations* (i.e., explaining the behavior of a system by its functions) and *physical explanations* (i.e., explaining behavior by laws governing a system's internal composition).

The unscientific image of the discipline and students' own unscientific folk psychological beliefs conspire to create deep misunderstandings about psychology as a science among the general population, including those taking introductory psychology. Introductory Psychology students score lower than students who have completed an advanced psychology Methods class on a questionnaire assessing psychology as a science (Friedrich, 1996). Among the detrimental consequences of this misunderstanding is that psychology students fail to involve themselves in research because they fail to see its value. This lack of involvement is a critical loss of opportunity as there is good evidence that carefully scaffolded research experiences promote student academic success (Kardash, 2000; Kuh, Kinzie, Schuh, Whitt, & Associates, 2005) and grasp of the discipline as scientific (Friedrich, 1996).

Our experience at Weber State University[3] is that psychology majors tend to complete the required Statistics and Methods course sequence as seniors, rather than as juniors or even sophomores. Whereas there are a number of reasons for this[4], one of the more frequent we hear is the traditional psychology student's lament: *I cannot see why I really have to take "science courses" as I want to be a therapist*. It is now clear that this very familiar complaint goes beyond a mere lack of knowledge. Rather, it reflects a deep misunderstanding of the discipline that costs students the opportunity to effectively prepare for a career in psychology or an aligned discipline.

## The Solution: Developing The Science and Profession of Psychology

While still encouraging students to begin the course sequence of Psychological Statistics and Research Methodology earlier in their academic career, we rejected *requiring* students take the courses as sophomores. The department had to respect the challenge posed to our students by Weber State University's quantitative literacy requirement (see note 3). Also, the department recognized that repeated exposure to foundational disciplinary concepts in lower and upper division courses could only be helpful in challenging students' misconceptions. So we created a new lower-division course, titled *The Science and Profession of Psychology*. The course is a strongly recommended elective to be taken by students after Introductory Psychology. The catalog description of the course reads as follows:

> *The purpose of this course is to build upon Introduction to Psychology so that students may better understand the discipline as both a science and a profession. The course covers a range of topics, including research, statistics, ethics, career options, graduate school options and preparation, critical to all fields of psychology and provides the skills necessary for students to succeed in upper-division courses and career preparation. This course is designed for students who are interested in or beginning to pursue psychology as an academic major or minor.*

We justified the course to the university curriculum committee by reference to the department assessment research, which has demonstrated that most students grasp the scientific foundation of psychology only as juniors and seniors (Amsel, Frost, & Johnston, submitted; Amsel & Kay, in preparation). Our evidence is consistent with other studies showing the significant influence of taking advanced classes, like Psychology Statistics and Research Methods, on students' reasoning (Lawson, 1999; Lehman, & Nisbett, 1990; Mill, Gray, & Mandel, 1994; VanderStoep, & Shaughnessy, 1997) and grasp of the science of psychology (Friedrich, 1996).

## Course Details: The Goals and Curriculum of the Course

The overarching goal of The Science and Profession of Psychology (SPP) is to educate students about the relation between the science and practice of psychology. Contrary to the depth of more advanced courses, SPP is designed as a survey of basic tenets of the science and practice of psychology. We address students' misconceptions about the discipline with: a) readings regarding the scientific nature of the discipline, b) carefully scaffolded research experiences which demonstrate how psychological claims are scientifically evaluated and professionally presented, c) deliberations about scientific and professional ethics, and d) discussions about career planning, including course selection, career management, and preparing for graduate school or a job.

The course addresses five specific goals. The first is to increase students' knowledge of psychological research. This aim may sound redundant with almost every other psychology course in which foundational statistical and methodological concepts are taught. However, our research shows that students remain unclear about precisely how statistical and methodological knowledge is relevant to the discipline. That is, although students demonstrate an understanding of differences between causal and correlational designs, they do not fully grasp that psychologists test theories using such methods. It is not until the upper division Psychological Statistics and Research Methods that students learn why and how psychology claims are scientifically evaluated. The course does not address the details of HOW to evaluate psychology claims but provides extended discussion of WHY it is done. The medium of that discussion is a very close reading of Stanovich's (2007) *How to Think Straight about Psychology*. The book is a polemic defending psychology as a science that is no different from other "hard" sciences. The book is read early in the course and provides a challenge to students' naïve beliefs about the foundation and epistemology of science as it is applied in psychology.

The second and third goals of the course are the development of critical thinking and professional writing skills. These goals are accomplished though a research project that allows students to think through the issues of data collection and write up findings in an APA style paper. The research is carefully scaffolded so that students learn foundational issues about research and specific data collection, entry, and analysis skills necessary to complete and write up the project. This research is fairly small-scaled but provides an opportunity to apply general concepts learned from the discussion of Stanovich (2007). The close scaffolding of students (as opposed to offering more autonomy to them) is based on a concern that if students are left to their own devices to design a study, they may just confirm their view of psychology as nonscientific and frivolous (Friedrich, 1995). Indeed, even the best students who are

involved in undergraduate research do not always learn the right lessons about the nature and epistemology of science unless they are carefully advised (Johnston, 2004; Roehrig, Austin, Hancock, & Slater, 2004). In the SPP course run during the fall 2006 semester, students worked together under the careful eye of the second author reviewing papers and designing a study examining the relation between time spent working at a job and GPA. Although somewhat "canned" and casual, we expected the experience would help ensure that students learn a) the critical attitude necessary for reviewing psychology research and evaluating psychology claims and b) preliminary skills for collecting, coding, entering, analyzing, and writing up scientific data.

The fourth goal is to increase students' knowledge of research and professional ethics in psychology. Presently, these skills are addressed in depth in upper division courses. For example, *research* career and ethics information are addressed in Research Methods and Tests and Measurement whereas *professional* career and ethics information is taught in Abnormal Psychology and Introduction to Counseling Theories. Although there remains a need for such information to be delivered in sufficient depth in upper division courses, initial exposure to the wide range of scientific and professional ethical issues would help students to grasp the connection between the activities. For example, students learn that one is ethically obligated as a therapist to base one's practice on established scientific knowledge (APA, 2002, paragraph 2.04). Similarly, they learn that researchers are supposed to monitor and take steps to minimize psychological harm (APA, 2002, paragraph 8.08 c). Moreover, many of our students work as para-professionals in half-way houses, treatment centers, and other jobs where knowledge of ethical limits of their therapeutic and research activities may empower them to avoid being exploited. This course should help students understand their own responsibilities in these settings and the professional responsibilities of their supervisors.

The final goal of the course is to increase students' knowledge of and preparation for a career in psychology or an aligned discipline. Whereas we readily acknowledge that few students will pursue graduate work in psychology (the limited job options for BA/BS psychology students are discussed in the class), the discussion of graduate program requirements provides an important opportunity for students to understand the role of science in the practice of psychology. Indeed, the discussion provides a "heads-up" of the kind of skills, emphasized in the course, that students are expected to acquire in the major or minor (e.g., reading primary research, SPSS skills, and APA style writing, etc.). Again, the course is not meant to replace the content of the upper-division courses; rather, it is designed to provide a survey of relevant issues and present the information in an integrated way for students to learn the connection between psychology as a science and profession. For these reasons, we are not surprised at the growth of new lower-division courses in various college and universities dedicated to introducing students to the major (Landrum, 2007).

## The Future: Assessing, Updating, and Positioning the Course

The Science and Profession of Psychology has been run twice in the fall of 2006, and spring of 2007, to small groups of approximately 15 students. The enrollment was small because the class was designated as an experimental course (with a 4900 designation) that scared lower-division students away. As a result, there has been no formal assessment of the course other than course evaluations. However, the evaluations have been particularly strong, with students acknowledging that they learned more about the discipline than the thought they would. After each class, a number of students sought out research and practicum experiences prior to or concurrent with taking research methods. We plan more systematic assessment of the course for its impact on students' understanding of psychology as a science. Until that time, The Science and Profession of Psychology will run as a strongly recommended course. We anticipate that our assessment will yield strong evidence that this course is an effective way to help students understand psychology as a science.

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## Notes

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[2] A Google search of the term *parapsychology* returned 2 million hits whereas a search of the terms "*scientific psychology"* returned 250,000 hits.

[3] Weber State University is a regional university in Utah, with an overall enrollment of approximately 19,000 students. The Psychology Department has 13 faculty members, about 420 majors, and graduates approximately 100 psychology students a year. To visit, go to http://departments.weber.edu/psychology.

[4] Other reasons for postponing taking the sequence until senior year include the semesters some student need to devote to completing the quantitative literacy requirement, which is a prerequisite to the Psychology Statistics and Research Methods sequence.

# Integrating Research Methods & Introductory Statistics

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McGovern, Furumoto, Halpern, Kimble, and McKeachie's (1991) reflection on undergraduate education in psychology offered eight common curriculum goals. One goal was to develop research methods and statistical skills, and "these skills should be fostered in separate courses" (p. 601). Their four curriculum models all included statistics and research methods as separate courses. Brewer et al.'s (1993) report on curriculum from the deliberations of the 1991 National Conference on Enhancing the Quality of Undergraduate Education in Psychology cited six specific curriculum goals. "Students receiving a bachelor's degree in psychology should have knowledge of statistics, research design, and psychometric methods" (p. 170). Perlman and McCann (1999) reported the statistics and research methods/experimental courses along with introductory, and a capstone experience were the top four most frequently cited courses among all undergraduate psychology courses. American Psychological Association Task Force on Psychology Major Competencies (2007) proposed 10 goals for the undergraduate psychology major and Goal 2 is "Research Methods in Psychology," which includes research design, data analysis, and interpretation.

## The Rationale for Change at Emporia State University

Statistics and research methods courses are important and ubiquitous in undergraduate psychology curricula. Until the fall of 2003, the undergraduate psychology curriculum at Emporia State University included these two courses. However, starting with the fall 2003 semester, the content of the two courses was integrated into a two-semester sequence including Descriptive Research Methods and Statistics in Psychology PY300 and Experimental Research Methods and Inferential Statistics in Psychology PY301.

The change was the result of two years of deliberation about the undergraduate psychology curriculum that instituted several major changes. The rationale for changing from the separate Statistics and Experimental Psychology courses to the integrated sequence was based primarily on faculty wanting to provide more support for majors required to do a research project in the Experimental Psychology course. The support provided in the integrated sequence included providing students more time to develop their ideas and having students complete a correlational study. Second, assessment data showed the retention and usability of the statistics content knowledge in the research methods course was not as high as the faculty expected and desired. Based on several tenets of cognitive psychology (e.g., semantic elaboration, Craik & Lockhart, 1972), the faculty concluded that the meaningfulness of the content knowledge of both courses would increase if research methods were presented with their accompanying statistical procedures.

## Descriptive Research Methods and Statistics in Psychology (PY300)

The faculty designed the PY300 course to introduce students to descriptive methodology and statistics used in psychology. Because the instructor uses low level, easy-to-read textbooks (Davis & Smith, 2005; Weaver, 2005), with lots of student research as examples, the PY300 instructor does not use traditional lecture in most classes after the first few chapters. Rather, students must read the assigned material prior to class, as they need the text information to complete activities during class. Students must also own a copy of the current *Publication Manual of the American Psychological Association* (American Psychological Association, 2001). Reading the assignments prior to class is quite challenging at first, but the need is quickly apparent, and once students begin, it becomes habit for most. Additionally, exams cover all the reading assignments even when there has been no formal lecture over the material. After coverage of hypotheses and theory, non-experimental research methods, ethics in psychological research, American

Psychological Association (APA) format and scientific writing, how to use PsycINFO, and descriptive statistical analyses, including measures of central tendency and variation, and APA format and scientific writing, students begin their small group correlational study.

At our institution, collecting data to present only within class is considered a class activity, not research, and therefore does not need to be reviewed by the Institutional Review Board (IRB). In groups of 4-6, students in PY300 design a mock correlational study. First, during a single class period, each group decides on what two variables they think are related to one another, and that they can collect data via survey questions/items. The faculty do not allow students to use variables that might be sensitive or reveal confidential information (e.g., GPA, sexual preferences, medical illness).

Given that most of these students only have completed Introductory and Developmental Psychology classes, they frequently need help deciding on two variables. The use of Undergraduate Teaching Assistants (UTAs) during this early class period is especially helpful, as each UTA can help a small group and the instructor can circulate among the groups asking and answering questions as needed. UTAs are students who recently completed this course with an A or B+, possess good social skills, and accept the instructor's invitation to be an UTA. Next, group members must each find five journal article abstracts related to their study topics, and members work together both in and out of class writing an introduction using just the abstract information. By only working with the abstracts, students quickly realize how difficult writing an introduction is. Learning this lesson now encourages students to read the full articles for their PY301 experimental projects.

Students must also work together to develop their surveys, which after receiving the instructor's approval, class members complete anonymously. Perhaps one of the most difficult tasks for the instructor is to not tell students what changes to make to their surveys so that their project "works," and rather let them make mistakes. The reward comes when during their presentation, they acknowledge that more careful wording would have been clearer to their classmates. This process allows the instructor the opportunity to emphasize the importance of piloting their experimental study in PY301.

Once all the surveys are complete, the instructor gives a tutorial in how to do a correlational analysis in Excel and SPSS, after which groups perform their analyses. Groups must meet outside of class to write their study as a brief APA-formatted manuscript. Meantime, the instructor has students manually computing correlations on smaller data sets in class, and also gives tutorials over making scatterplots, writing results in APA format, and developing PowerPoint slides. Finally, each group gives a 15-20 minute oral presentation and the group submits one final paper.

Because this course is a prerequisite for Experimental Research and Inferential Statistics in Psychology (PY301), students develop experimental research ideas and hypotheses in the first four weeks of the PY300 class. With intermittent prodding by the instructor, students perform their literature search, type their references in APA format, obtain and read a minimum of seven research articles, and write summaries of those articles. Having the students complete the references page(s) of their experimental proposal and submit summaries of their articles prior to the end of the PY300 course discourages procrastination; as rough drafts of their introductions are due the first week of the PY301 course. During the last three to four class periods of PY300, the instructor begins coverage of the basics of experimentation.

## Experimental Research Methods and Inferential Statistics in Psychology (PY301)

Two objectives of the PY301 course are to develop an understanding and appreciation for the necessity and difficulty of systematically studying behavior and mental processes, and to prepare for intelligently scrutinizing explanations of behavior provided by psychologists, friends, the media and others. During this course, students learn about experimental designs and the appropriate inferential and non-parametric tests for the different designs and types of data collected. They use the same textbooks as in the previous course, and class time primarily continues to consist of hands-on activities. The "simple true" experimental project for this course includes preparation of an APA-formatted proposal submitted to the IRB, data collection, data analysis with SPSS, an APA-formatted final manuscript (after multiple rough drafts of each section), a PowerPoint presentation to the class, and a poster presentation at the department-wide Student Research Symposium and Luncheon that concludes each semester.

The syllabus for this course includes guidelines addressing each section of the proposal, as well as for the sections of the final manuscript. For a copy of the syllabi for these courses, go to http://www.emporia.edu/~groverca/. Included in the guidelines are the page numbers for related information in the APA publication manual. The

department keeps two copies of the publication manual in the classroom where several computers are also available to students. Additionally, students are required to adhere to the department writing standards as described in the handbook on the department web page, which can be found at: (http://www.emporia.edu/psyspe/documents.htm). Students submit rough drafts of each section of the proposal separately, and the instructor returns them to students in the subsequent class.

The biggest challenge with the sequence is dealing with transfer students who have completed either a statistics or research course, but not both, at their previous institution. These students must be required to enroll in both PY300 and PY301 because of the extensive overlap. From the faculty's perspective, students can never get too much of either research methods or statistics, but students tend to have a different opinion. Thus far, once convinced, those transfer students who have taken PY300 and PY301 have indicated they are glad they have had to do so.

The benefits to this approach include students completing correlational and experimental studies, writing two research papers in APA format, and presenting orally to their peers and in poster format to the department. Faculty comment that students seem better prepared for conducting more advanced projects as independent research and/or the research option of the senior internship (PY490; see department web page for internship handbook). The stand-alone Statistics course (PY520) is taught as an elective, and early feedback for students who have completed the PY300 and PY301 sequence and then take PY520 is that the lower level courses provide an excellent foundation for the statistics course. By integrating the research methods with their statistical procedures, students now complete all of the steps and stages of a simple true experiment with extended time for development of ideas and faculty support to foster application and retention of the information.

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# Creating Research Groups in an Undergraduate Psychology Curriculum

**Bernard C. Beins**[1]

***Ithaca College***

Research constitutes the backbone of any empirical discipline. However, at the undergraduate level, psychology students have the reputation of avoiding courses that involve quantification and actual research. In the past thirty years, over 70 articles about statistics and research methods have appeared in the journal *Teaching of Psychology*.

Typical, large research methods courses may be inappropriate for generating a positive attitude regarding research. Small-group research may ameliorate the situation. As Prince (2004) noted, meta-analysis has revealed that cooperation (versus competition) and collaborative work improve academic achievement, quality of interpersonal interactions, and self-esteem. When students work in a collaborative environment on research projects, it seems reasonable to predict that they will achieve academic success while enjoying the social nature of the research culture.

One can see an added advantage to the collaborative model of teaching research. When students enter their careers, the ability to work in teams is paramount for success (Landrum & Davis, 2004). It is also likely that students who are personally inculcated into the culture of research will respond more positively to empirical projects than will students whose first encounter with research involves large lectures and abstract content divorced from application.

Unfortunately, many undergraduate psychology programs incorporate little research into their curricula (Perlman & McCann, 2005) even though graduating seniors advise first year students to do research (Norcross, Slotterback, & Krebs, 2001). This lack of research-based curricula is nothing new, having been identified half a century ago (Buxton et al., 1952).

Although it may seem counterintuitive, one of the best ways to meet these challenges may be to immerse students deeply in the research environment. The Psychology Department at Ithaca College has developed a program that involves a well-defined continuum of courses that is quite research-intensive, culminating in three semesters of group research.

## Description of College and Department

Ithaca College is a private, primarily undergraduate institution with about 5,900 undergraduates and between 200 and 300 Master's students. The Psychology Department is exclusively undergraduate with about 225 B.A. Psychology majors and 50 B. S. Applied Psychology majors. There are 12 tenure-line faculty. Psychology majors at Ithaca College complete seven semester-long courses involving statistical and empirical aspects of research during their four undergraduate years. These courses generally begin with the first course in their first year, a laboratory course accompanying the introductory course. Figure 1 presents a schematic diagram of the Ithaca College Psychology curriculum. Psychology majors complete 15 courses, with little choice among them. Students can (and do) take elective courses in psychology beyond those that are required (see Figure 1).

Ithaca College offers a second option for psychology students: they can major in Applied Psychology. Ironically, these students are not required to take Research Team. Further, they must take courses in Mathematics, Computer Science, Economics, Business, Accounting, and Communications; these disciplines provide the applications in the title of the major. The intent of this major historically was to prepare students for jobs in the business world. There is a 3 or 4 to 1 ratio of traditional psychology majors to applied psychology majors.

The unique feature of our program is the required-three semester commitment to a Research Team led by a single professor as part of the teaching load. The Research Teams span a variety of topics, as shown in Table 1, so virtually any student can find research to his or her liking.

Amid the positive aspects of this research program, there is a significant price the department pays. Because Research Teams are relatively small, (i.e., typically about a dozen students), the teams require considerable faculty resources. The department has to cover the required courses and,

because the Research Teams are small, needs several sections to accommodate all students in the major. Consequently, there is little flexibility in teaching schedules.

Furthermore, the department regularly faces difficulty placing all students on Research Teams because space limitations are a reality. There is literally a cap on how many students can join a given team because of room capacities based on fire codes. Beyond this, the faculty recognize the need to keep teams relatively small in order to promote close interpersonal interaction between faculty and students and among students. Each semester, a small number of students must defer joining a team for a semester due to space limitations; typically these are younger students (e.g., first semester sophomores).

## Outcomes of the Research Team Program

Ithaca College psychology students learn early that the discipline is research-based, and the rigorous, empirical nature of the psychology major does not deter students.

### *Student Presentations*

Some notable outcomes illustrate the fact that students embrace their research opportunities, all of which are entirely optional. Students regularly attend and present at two regional conferences, the University of Scranton Psychology Conference and the Eastern Colleges Science Conference and occasionally at others. Students also co-author and co-present their work at professional conferences, such as the annual conventions of the American Psychological Society, the Eastern Psychological Association, the New England Psychological Association, the Society for Research in Child Development, and the Society for Personality and Social Psychology.

During the 2005-2006 academic year, 30 psychology students presented their work at conferences. The range of projects is considerable, as shown in Table 2. The current listing plus work in previous years is on the Psychology Department's web site: http://www.ithaca.edu/psychology/students/student-present.htm.

This extensive productivity by the students has been fairly consistent over the past 15 years. The faculty in the Psychology Department have a shared vision of the value of this activity, so the culture of research has flourished among both faculty and students.

### *Independent Research Projects*

After the students complete their required research, they often elect to continue their research experience through independent research project. Approximately 30 students elect to take this path during a given year. All of these projects are voluntary and reflect student interest rather than a mandate.

The Research Team experience obviously suits students given the number who continue after they have finished their requirement. In some cases, students continue to study the topic of their Research Team, but sometimes they venture into new areas.

### *Graduate School Acceptances*

A final measure of the effectiveness of the curriculum is reflected in the acceptances of our students into graduate programs. Some choose to study psychology, but they show a diversity of paths. Naturally, many students pursue education in the helping professions like counseling, school psychology, and social work. But each year, a handful of students enter doctoral programs with a research emphasis. A listing of graduate acceptances appears on the Ithaca College Psychology web site: http://www.ithaca.edu/psychology/students/graduate.htm.

Such accomplishment would not be predictable from our students' academic profiles when they enter college. Ithaca College's Psychology majors are above average on the SAT, but not overwhelmingly so. The typical psychology student's SAT score is around 1050 or 1100. With such a student population, one might not expect to see so many proceed to graduate school. Given the priority that graduate programs place on research experience (*Getting in*, 2007), it seems reasonable to conclude that the research experience fosters their acceptances.

## Conclusion

Social scientists know that empirical research is the fundament of our disciplines. In many instances, though, incoming students are more interested in the content of the discipline than in the methodology. The Ithaca College model inculcates students into a culture of research that complements the content.

Students have responded well, with upper level students serving as positive role models for beginning students. For example, on most teams, advanced students take lead roles on research projects and make presentations at conferences. Consequently, younger students have models to emulate. As a

function of the psychology curriculum at Ithaca College, students starting their Research Team experience take it for granted that psychology students conduct research, a recognition that is reinforced when they see what advanced students accomplish. They often express puzzlement about how one could be a psychology major without doing significant amounts of research. The overall effect of this research-intensive program, with group research as the centerpiece, is to attract a large number of majors whose accomplishments as undergraduate are impressive.

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**Table 1**

*The Current Research Teams in the Psychology Department at Ithaca College.*

| Research Team Name | Research Team Description |
|---|---|
| Human Motivation | This team investigates the impact of perceived judgments of responsibility for disease onset on person perception and behavioral response. |
| Cognitive Development | Two areas of focus are infant language and the impact of emotion on cognition. |
| Psychology of Humor | This team studies psychological aspects of humor, including factors that influence the appreciation of humor. |
| Psychology of Television and Other Media | This team conducts research concerning television and social cognition, especially as it relates to social and cognitive development in children. |
| Neuroscience | This team is designed to expose students to laboratory and research techniques in behavioral neuroscience. |
| Social Judgment | This team takes a social-personality psychology approach to studying how people make sense of their internal states, and how the sense they make affects their motivation and social judgments. |
| Clinical and Mental Health Research | this team revolves around broad issues of mental health and abnormal psychology, particularly as they apply to college students. |
| Developmental and Educational Psychology | This team focuses on qualitative and quantitative research to study development and learning and to evaluate educational programs. |

**Table 2**

*Titles of psychology student presentations at undergraduate research conferences in the 2005-2006 academic year.*

*Oral Presentations*

How expectations affect perceptions of offensive humor

Speech-gesture synchrony in mother-to-infant word presentation

Infant looking behavior in synchronous vs. Asynchronous bimodal object sound

How much fruit is in froot loops? Effectiveness of a media literacy

Curriculum in improving children's nutritional knowledge

The role of speakers: gestures in supporting early word acquisition

A great schism: how differences between religiosity and spirituality are related to identity styles and anxiety

Effective teaching methods for foreign language acquisition and learning

The effect of language on infant looking behavior

Perceptions of offensive humor

*Poster Presentations*

Individual and confederate group effects on conformity

State of the union: red state and blue state identities predict

Stereotyping

A study of male student-athlete identities

College students in transition: contributions to identity

The interactive effects of emotions and ease of recall on predictions of behaviors of self and others

The effects of priming on humor responses

The serendipitous effects of uniform in a quasi-experimental study of anxiety

Exploratory study of prescription amphetamine use on a college campus

Part of this complete breakfast: an analysis of children’s food commercials

That's not my pyramid! Nutritional content of foods advertised to different target audiences on television

Personality dimensions and perceived sense of humor

The role of context in violent humor

Beyond the written word: effects of regulatory fit on transportation and persuasion via narratives

Factors that influence reporting of socially undesirable behaviors

Seasonal congruence and its effects on transportation

Knowledge of media literacy and internet credibility among US college students

The effects of floral scents on cognitive performance, subjective well being, and physiological responses

The relationship between race, diabetes status, and the believability of health information sources.

The role of speakers' gestures in supporting early word acquisition.

Personality characteristics and humor

Cross cultural differences in the predictors of depression

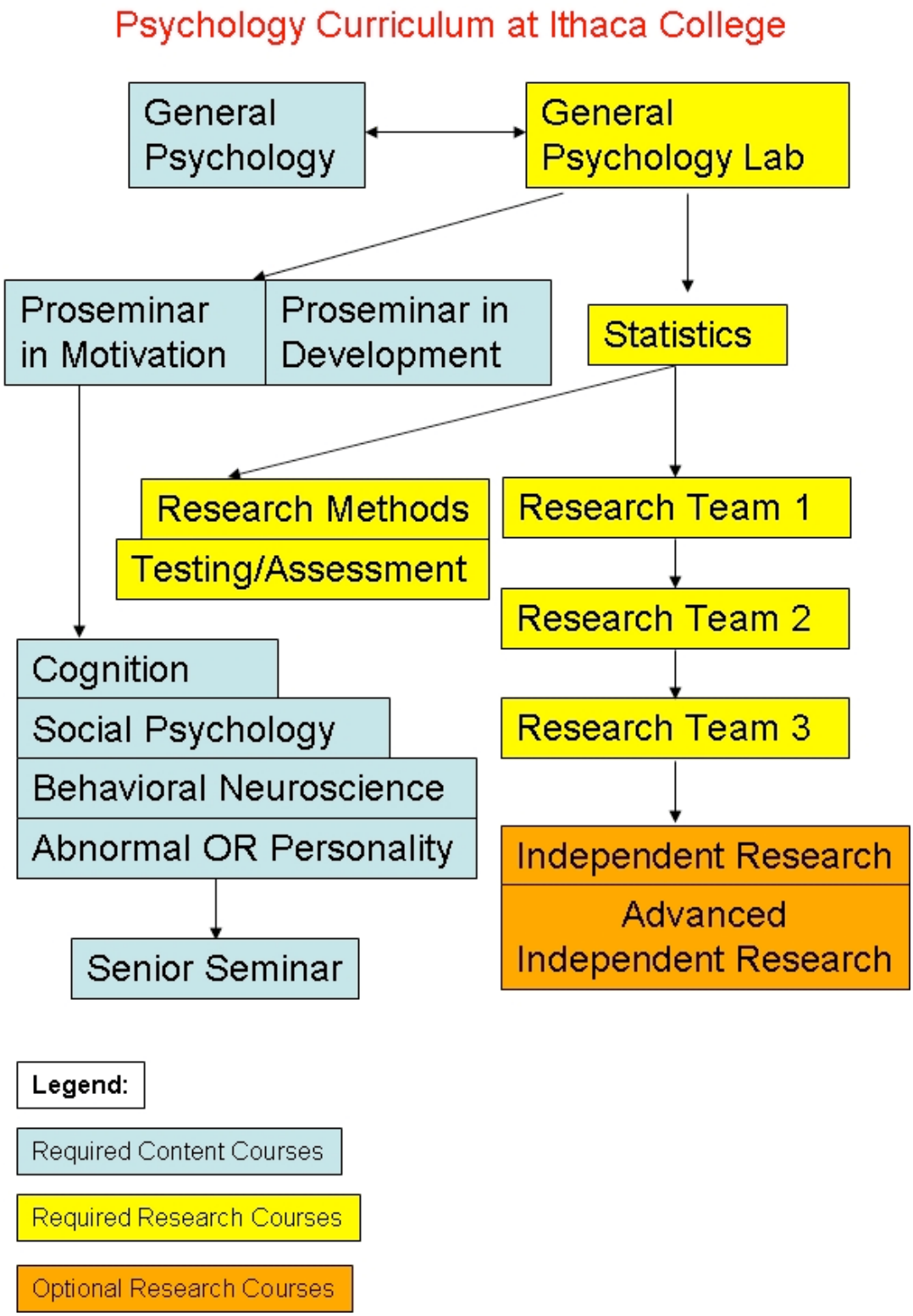


***Figure 1*. Psychology Curricula at Ithaca College**

# Advanced Laboratory Courses in Psychology

**William Wozniak**

***University of Nebraska at Kearney***

Natural science laboratory courses are stereotyped as occurring in a room called a laboratory that includes the accoutrements of science (i.e., Bunsen burners, test tubes, dissection kits, and other more sophisticated equipment for data collection). Lab classes are usually three hours in length and include supervised re-creations of standard or historically significant experiments. These experiments usually follow preordained scripts that allow the students to practice the particular techniques associated with the discipline. Gale and Andrews (1989) described three goals for labs, including (a) practice and mastery of specific technical skills, (b) mastery of the skills of the scientific process, and (c) experiencing abstract concepts in a concrete manner.

Of late, the term "laboratory course" has been associated with other hands-on activities, such as programming a computer, working mathematics or statistics problems under the tutelage of an experienced student mentor, performance practice in the fine arts, and many forms of field work including data collection, practical experience, and service activities. Indeed, as the definition of laboratory courses is attempted outside of the natural sciences, it is less the stereotype and much more inclusive of any "hands-on" experience that is associated with an academic discipline.

At the University of Nebraska at Kearney (UNK), laboratory classes do not have a formal definition, however, laboratory fees do. A laboratory fee "is defined as a charge made to students to underwrite, in whole or in part, the cost of consumable supplies utilized in a laboratory environment. The laboratory fees are to be utilized for the cost of consumable supplies and not for other expenditure items such as personal services, travel and capital purchases." A perusal of the UNK catalog shows that lab fees are associated with classes from Art, Biology, Chemistry, Health Science, Industrial Technology, Journalism/Mass Communication, Music, Theatre, Professional Teacher Education, Physical Education, Physics, Psychology, and Special Education. "Laboratory" instruction clearly has grown beyond the stereotypic natural science laboratory.

The definition of a laboratory course is similar the problem the Supreme Court faced in attempting to define pornography. Justice Potter Stewart tried to explain what is obscene by saying "I shall not today attempt further to define the kinds of material I understand to be embraced…*but I know it when I see it*…" (Jacobellis v. Ohio, 1964). In order to clarify the situation and to avoid a "Justice Stewart" definition, it is very important to define what is meant by a laboratory course and what learning goals are being met by the lab experience.

A psychology laboratory course can be defined neither in terms of a laboratory room nor by the fees attached to the course. Indeed, it is unfair to define a particular course or type of course, such as a laboratory, without considering the context in which the course is offered. The contextual considerations include the type of students in the class, the qualifications and interests of the instructor, the appropriateness of the topic coverage as dictated by the discipline, institutional facilities and support, and most importantly, the goals for student learning as defined by their program.

At the UNK Department of Psychology, in order to provide general foundation in the various content areas of the field of Psychology and to prepare students in methodology especially if they wish to attend graduate school, we wanted to get students involved in empirical research. The programmatic strategy to reach these learning goals is to give students generic statistical and scientific skills in our core courses, then, to give them to opportunity to do empirical research in at least two advanced laboratory courses. These advanced labs are tied to specific content classes, such as Memory & Cognition and Experimental Social Psychology.

## Prerequisites to the Advanced Lab Experience

Prior to taking an advanced lab, students must complete two "laboratory" courses that form a portion of the core requirements for a psychology major. Behavioral Statistics is a sophomore-level course akin to any Introductory Statistics course. However, it includes a one-hour lab session wherein

students work through a set of exercises that reinforces statistical concepts and develops skill in spreadsheet software and the Statistical Package for the Social Sciences (SPSS™). Experimental Psychology follows Behavioral Statistics in our core sequence. This class focuses on scientific methods and research design. It also includes a one-hour lab in which skill in APA-style writing is developed. Students complete a data-collection project, designed by the instructor, but implemented by the students. All of the steps of the research process (including IRB Review, data collection, data analysis, and final write up) are completed under the close supervision of the lab instructor.

These two core laboratory courses closely follow the template of a traditional natural science lab because each involves a set of prescribed activities monitored by the instructor. There is little freedom for the students in determining the type of activities that they may do to fulfill the course requirements. However, these courses attempt to provide the students with a common set of skills that they use on subsequent labs where they are afforded more freedom. A list of all of the Psychology Laboratory courses is displayed in Table 1. All Psychology majors must complete Behavioral Statistics, Experimental Psychology and two Laboratory Courses. In some special cases, a student may be given permission to count a Practicum as a lab course. Regardless, all students must complete Statistics and Experimental before they are allowed to enroll in an advanced lab.

## Advanced Labs Descriptions

Two of these advanced Psychology Laboratories, Learning and Conditioning, and Physiological Psychology, follow the format of a more traditional lab course. That is a prescribed set of activities, supervised by an instructor, with little freedom for independent work. For example, the Learning and Conditioning Laboratory involves a prescribed set of operant conditioning activities that each student must complete. Each student is assigned a rat from our laboratory and during the laboratory period implements an operant conditioning plan to train the rat in an operant chamber. Students write up laboratory reports concerning these activities.

The remainder of the advanced Psychology laboratory courses has the generic structure of a 3-hour lecture with an optional 1-hour laboratory section. Students have the choice of taking the course as a traditional lecture only, and Psychology majors, who have successfully completed Statistics and Experimental, can add the lab to fulfill their lab requirement. The uniform expectation in these labs is that each student will produce an APA-style report of an empirical project designed by the student in conjunction with the instructor. Lab sessions meet for approximately one hour per week.

In some cases, the first few sessions review techniques used in the subdiscipline. For example, in the course, Memory and Cognition, techniques of measuring memory are reviewed (e.g., recognition, recall, relearning) as well as a review of the pitfalls and limitations of such techniques. In other instances, the instructor will review research areas of interest in order to encourage the students to think about their own project. Then in subsequent class sessions, the students design their own studies under the advisement of the instructor. The topic selection and research design is a subject of some negotiation between the students and the instructor. Issues such as expertise of the faculty member, practicality of the project, availability of participants, availability of equipment, and appropriateness of the subject are discussed and considered during this time. A list of topics selected by UNK students during the 2006 – 2007 academic year is presented in Table 2.

The students may form research teams to share the burdens of conducting a large project. Some lab courses require that teams be formed (usually from two to four students), other labs allow individual students to do projects. Most labs will allow to one final co-authored paper to be submitted to meet the lab requirements. In these cases, there is some form of monitoring the workload of each member of the research team to ensure that social loafing is minimized.

Most of our labs are Writing Intensive (WI) courses as prescribed by the University. Every student must take 12 hours of WI courses. Each WI courses include minimum writing requirements (in terms of words written, a minimum of 5000 words), a maximum class size of 25, an emphasis on writing as a means of communication within the discipline, opportunities for the student to revise their writing after getting feedback from the instructor, and that a substantial portion of their grade be based on writing assignments. The formative assessment of student writing can occur at many steps of the research process, including the Institutional Review Board (IRB) proposal, development of written materials for data collection, and the final write up of the project. In some labs, students are also required to prepare a poster presentation or a formal oral presentation of the research.

Students are encouraged to present their research results at regional conferences. UNK is fortunate to have student-oriented conferences within relatively short distances in both the fall and spring. UNK provides funding for such academically-oriented field

trips, so student presenters can have most of their expenses covered. (UNK has also supported a large contingent of student researchers participating in the National Conference for Undergraduate Research—in 2007 in San Francisco. Many of our students have attended this conference.)

Some faculty members "require" their students to present, whereas others give strong encouragement. The typical sequence is that first-time presenters will prepare a poster of their research in order to get a taste of a professional convention. Second-time presenters are strongly encouraged to give an oral presentation. A good number of our students with high quality projects may present their projects (usually supplemented with more data) at regional or national conferences. Subsequent to the laboratory course, students have the opportunity to follow up their project with an independent research project under the course Independent Research. In other cases, students in the UNK Honors Program may develop their laboratory project into an Honors thesis.

Other non-lab Psychology courses have been designed so that students have the option of doing an empirical research project or writing a term paper. These courses are also listed in Table 1. Because the empirical project may be done by a group of students, there is an appeal to pick this option.

## Assessment of the Advanced Labs

The advanced labs in Psychology have contributed much to the learning culture of the department. Because the requirement of doing research is uniform for psychology majors and given that the rewards for conference participation are fairly obvious, we have a large number of students involved at various stages of research at any one point in time. The culture of learning and research is quite obvious during the weeks preceding a student conference. Students are given the opportunity to practice their presentations in front of other department faculty and some will give their practice presentation two or three times. During this time, the sense of *esprit de corps* is palpable in the Psychology Department.

Although laboratory courses involve a heavy workload for the instructor, there is an opportunity to develop one's own research program. Many students will not have developed a specific research interest and are eager to take on a research question within the faculty member's area. In some cases, this collaboration has led to coauthored publications. This result is a fine example of how teaching and scholarship can overlap. Boyer (1990) further developed these interrelationships. Even so, the teaching load associated with a lab is greater than a traditional lecture/discussion class, and should be considered by the administration is a fair compensation formula. At UNK, because the labs are 1-hour additions to 3-hour classes, they are added to the teaching load (0.75 hour per section of lab).

The use of research teams has posed some problems for assigning grades. It is possible that one outstanding student could carry the workload and the writing load for one or two weaker students. Some instructors have each team member rate the contributions of his or her teammates for each component of the research project, including each section of the paper. The instructor can then adjust the individual grade based on the student's contribution to the project. Because each lab is attached to a 3-hour lecture course, there is typically an additional review paper assigned. Every individual student has to complete the paper. Some instructors allow the review paper to be on the same topic as the research project, other insist that they choose a different topic. This additional paper certainly gives the instructor a clear picture of each student's performance, even though a single co-authored paper was completed for the lab.

As can be seen in Table 2, the range of possible topics covered by the projects is extensive. The projects listed in the table were from four instructors, who taught 4 lab courses and 3 courses with optional projects. (The list excludes topics covered in projects for Experimental Psychology.) In order for students to have a degree of ownership of their research projects, instructors need to be flexible in the range of topics that are appropriate for their labs and that they are willing to mentor. Whereas some faculty are reluctant to stretch their own expertise to mentor such projects, others have benefited because it encourages faculty to seek the advice of other members the department.

## Conclusion

McKeachie (1999) wrote "laboratory teaching assumes that first-hand experience in observation and manipulation of the materials of science is superior to other methods of developing understanding and appreciation of research methods." (p. 149) However, he went on, in his seminal work, *Teaching Tips*, to say that little research has been done to the benefits of a laboratory experience on students' skills, such as scientific inquiry or understanding of how scientists think and work. However, assessing the effects of a single course without considering it in the context of the entire program may be misleading. It has been our experience that the positive effects of undergraduate student research are most apparent

after the students have graduated. We have many anecdotal reports of UNK alumni who report that they felt well prepared for their first year of graduate school, sometimes better prepared than many of their peers. We also have corroborating testimony from directors of graduate programs that have accepted out students. We can also speculate (and have some preliminary data to indicate) that these experiences lead to greater student engagement not only in their course, but with the campus and ultimately with the discipline.

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**Table 1**

*Psychology Laboratory Courses at the University of Nebraska at Kearney*

| | |
|---|---|
| Traditional Laboratory Courses | |
| Behavioral Statistics | Learning and Conditioning |
| Experimental Psychology | Physiological Psychology |
| Laboratory Courses with an Empirical Project | |
| Sensation and Perception | Memory and Cognition |
| Biopsychology | Psychometrics |
| Experimental Social Psychology | Developmental Psychology |
| Psychopathology | |
| Non-Laboratory Courses with an Optional Empirical Project | |
| Science and Skepticism | Cross-Cultural Psychology |
| Environmental Psychology | Industrial-Organizational Psychology |

**Table 2**

*Student Research Topics in Psychology Laboratory Courses at the University of Nebraska at Kearney During the 2006-2007 Academic Year*

| |
|---|
| Road Rage and Parenting Style |
| Gender Differences in Way Finding |
| Gender Differences in Aggression Relating to Sexual and Emotional Infidelity |
| Effects of Cosmetically Altering Waist to Hip Ratio in Pictures of Female Models |
| Gender Differences in Multitasking |
| When Is It Torture? The Effects of In-group and Out-group Priming |
| Cognitive Dissonance Among Individualists and Collectivists |
| Seeking Social Support After Failure: Cultural Syndromes |
| Sources of Relationship Satisfaction for Individualists and Collectivists |
| Gender Differences in Rudeness: The Role of Gender Socialization |
| Reasons for Rejecting Racism as an Explanation for Katrina Rescue |
| Resistance to Organizational Change: Locus of Control, Experience, and Personality |
| Reactions to Failure/Stress in the Workplace |
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| Analysis of False Memory |
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# Increasing Undergraduate Research Participation: From Classrooms to Conferences

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Within our curriculum, emphasis on student research begins during Career Planning for Psychology Majors (PSYC 100). During this course we emphasize the important role research engagement plays in the quality of their undergraduate experience, and their opportunities for employment and advanced training after they graduate. In various meetings of this class, faculty, graduate students, and undergraduates participating in research, as well as former and current undergraduates who have obtained research-related employment, are gleefully paraded before our new majors to emphasize the central role of and opportunities provided by research involvement. Research participation is emphasized for newer students outside of class as well. Because beginning students often take their cues from advanced students, meetings and events of our Psi Chi Honor Society and Undergraduate Psychology Organization are jointly held, maximizing the interaction of our most academically successful and research-oriented students with our newest students.

Several years ago we decided we needed a way to involve more undergraduates in research. This decision is consistent with arguments (e.g., Wilison & O'Regan, 2007) and findings (e.g., Ishiyama, 2002) from a wide range of disciplines that undergraduate research participation can play an important role in undergraduate education (though to be honest, we did not review this literature when making our decision; it just seemed like a good idea). However, we found ourselves at the upper limits of availability of the traditional one-on-one mentoring our 20-plus research-active faculty members could provide, even with the considerable help of our 90-plus graduate students and excellent funding from several department, college, and university sources. To compensate for this stressed availability, we decided that two important components of the learning usually accomplished during research mentoring (i.e., multivariate statistical analysis and preparation of those analyses for public presentation) could be reproduced, at least partially, within selected classes. Whereas the classroom experience would certainly not be as complete or as rich an experience as the analysis and presentation of data from research they had collaboratively designed and collected with faculty, these types of research activity would provide important training and experience that might function as a gateway to further research participation (Landrum & Nelsen, 2002).

We decided to change our quantitative methods curriculum to better prepare students for traditional research participation and to provide for more classroom-based research. After consulting with our faculty, the sophomore-level course Research Methods and Data Analysis (PSYC 350) was overhauled in several ways. This course, required of all majors, now has a more balanced treatment of experimental and non-experimental research designs, reflecting the methodological mix of our faculty's research and better preparing student for work with archival data collected using non-experimental designs. The methodological and design topics are introduced first, and then extended with the introduction of each statistical model so students better understand the range of possible applications of the different analytic models and the value of mixing experimental and non-experimental designs within a research topic. The course introduces both factorial designs and multiple regression, which are the two most common analytic models used by our faculty and much of the discipline. Two laboratory projects are completed, one involving multiple analyses of archival non-experimental data (there are three large datasets to choose from) that is presented in poster format along with an APA-style manuscript, and a second involving experimental data collected by the students that is presented in a multimedia oral format.

Two additional courses that are offered for students who want to further their research training and expand their quantitative skills were also retooled. Many of the students taking these courses are engaged in collaborative research with faculty and graduate students and plan to produce their own independent research, whereas others are have come lately to the realization of how important research is,

but have not yet found a source of collaboration. The purpose of these courses is to introduce advanced undergraduate students to research designs and data analytic techniques that are most often taught at the graduate level. We find that this expanded repertoire allows students to take a greater role in their collaborative research, promotes the development of independent research efforts, and strengthens their graduate or professional school applications. Selecting appropriate statistical models that match research hypotheses or questions, correct use of a statistical package, and clear integrative presentation of the results in manuscript, poster, oral and web-based formats are emphasized in both courses. Both courses also require a substantial research project, each of which is conveniently timed to correspond with opportunities to present their work at local, state and regional conferences.

One course, Advanced Research Methods and Analysis (PSYC 450, usually 40 students), emphasizes factorial research designs and their analysis with various ANOVA and ANCOVA models. The minimum analysis for the course project is a 3-way factorial design, preferably with a mixture of associative and causal effects, with at least two dependent or response variables. The other course, Psychological Measurement and Prediction (PSYC 451, also approximately 40 students), emphasizes multiple regression, discriminant function, cluster analysis, and factor analysis. The minimum analysis for the course project is the comparison of alternative nested and non-nested multiple regression models, comparison of multiple regression models across alternative criterion variables or across populations, or the comparison of alternative nested and non-nested linear discriminant function models for multiple groups.

The highlight of each of these courses, for the students and especially for the instructor (the first author), is the semester research project. Students may use data sets from research they are currently working on, but more often they solicit datasets from the faculty or graduate students with whom they are collaborating, or use one of several data sets that have been donated by our faculty. Using these archival data allows the students to invest their efforts in the sophisticated statistical analysis of large multivariate data sets, and the interpretative and writing challenges that follow. The project in each course is prepared either as a poster or a multimedia oral presentation, along with a complete research report. Over the last 10 years more than 400 of these research projects have been presented by the students at state (e.g., Nebraska Psychological Society or Nebraska Psychological Association) or regional (e.g., Great Plains Student Psychology Conference, Psychological and Educational Research in Kansas, Midwest Psychological Association) research conferences, and approximately 200 more have been presented at various university functions (e.g., UNL Research Fair).

We are happy to have a corporate sponsor who shares our commitment to undergraduate research training to help defray the costs of this research and the conference presentations. Talent Plus, a locally founded and internationally based human resources consulting firm, helps in several ways. They cover the costs of poster preparation and printing for students who present their research in that format at a conference, as well as the students' conference registrations and meals. Talent Plus and the department also give each presenting researcher a "Talent Plus & UNL Psychology Undergraduate Research Participation" certificate. Over the years Talent Plus has hired almost a dozen of our students for various research and data analysis positions, which provides an additional incentive to our students to master the techniques and procedures.

Completing this type of large project and presenting it at conference, though initially scary, is clearly a huge motivator to further participate in research for the students. For example, over the last five years, at least 13 students have completed a research project working independently and presented it at a conference during the semester after they had finished both of the 400-level courses. Nine students have approached the faculty who donated the archival data the student used for their project analysis and completed a collaborative project, usually on the same research topic. Eleven students have used their project as a jumping off point for their Honors Program thesis.

In combination, early emphasis on undergraduate research participation, a research methods curriculum focused on the range of designs and statistical techniques emphasized by our faculty, and the opportunity to engage in the completion and public presentation of advanced statistical analyses has been beneficial for our students. Students who take advantage of collaborative research with our faculty are better prepared for a deeper engagement in that research. Also, many students who do not have the opportunity for collaborative research get a taste of the process, and acquire methodological and quantitative skills that could act as gateways to advanced training or employment opportunities.

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# Mentoring Undergraduate Research in a Principles of Assessment Course

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Students sometimes fear the unknown or the threatening. The word "statistics" has elicited substantial sympathetic and amygdalal activation since the term was coined. Similarly, the concept of "psychometrics" may often create varying emotional reactions ranging from boredom, apathy, and indifference to fear, terror, and horror. "How do I convince students in a psychometric/measurement class that this stuff really matters?" is a question I have frequently asked myself prior to fall semester. Fortunately, I have found an approach that really seems to work…have students find out for themselves by applying the principles to help solve real-world problems and address modern-day issues through organized and carefully conducted research projects.

Experiential learning has long been a staple of education. Drawing from the works of John Dewey, Len Vygotsky, Kurt Lewin, David Kold, Jean Piaget, and others, contemporary educators have formalized and systematized a blend of experiential learning activities that have augmented student learning and addressed civic and community needs. The literature is replete with studies citing the beneficial effects of undergraduate research experiences in general science curriculum (e.g., Barrie & Seymour, 2007), education (e.g., Waite & Davis, 2006), the medical sciences (e.g., Hancox & Shaw, 2006), and in student affairs offices (e.g., Murray, Naimoli, & Kagan, 2004).

In the social sciences, Ishiyama (2002) found that those students who reported having participated in collaborative research with faculty, especially those who were so involved early in their educational experience, reported more substantial gains in their ability to think analytically, to integrate and synthesize ideas, and to learn independently. Students in psychology have ample opportunity to participate in faculty mentored research projects. Perlmann and McCann (2005) surveyed over 500 psychology departments across North America and found that of the 203 responding departments, 199 (98%) offered courses in which research activities were available for students; 160 (79%) of departments required research-based courses. We espouse these practices in the Psychology Department at Southern Utah University and continually seek ways to involve undergraduates in research projects.

## Description of College and Department

Southern Utah University (SUU) is a Baccalaureate College located in Cedar City, Utah approximately 300 miles south of the state's major population centers. We are a destination college, with most of our students coming from both the major population centers to our north, and from various rural areas of the State. The institution grants approximately 100 Master's Degrees, 950 Bachelor's Degrees, 90 Associate's Degrees, and 15 Certificates per year. We have approximately 250 majors in the Psychology Department who are served by 7 full-time Faculty, two Lecturers, and one Department Secretary. All of our faculty embrace active and experiential learning. We are committed to undergraduate research and serve as mentors to students in various ways. This paper outlines one experiential learning approach applied to the psychometric/measurement class I offer through the department at SUU.

## The Principles of Assessment Course

In this class, students are expected to conduct some form of experiential research project addressing psychometric and measurement issues. Students select their project ideas from three outlined possibilities. First, students can choose to evaluate the reliability or validity of a psychological test, survey, or other measurement tool. A second option is for students to explore relevant social issues and opinions by taking all the steps necessary to develop, test, administer, and tabulate data from their own reliable and valid survey. Finally, students can opt to design and carry out a program evaluation for a local human service agency or university department. In any case, the principles we discuss in class are directly related to and relevant for the projects being

done. Students have the option of either working independently on their project or joining a team of no more than four students. I encourage students in work groups to share the load in all aspects of the assignment, and avoid doing only those tasks with which they have expertise and/or familiarity. Those choosing to work independently have the option of extending the course to a year-long experience worth six credits instead of the traditional 3-credit semester long class.

Throughout the first few weeks of the semester, we discuss the statistical and psychometric principles required for the kind of learning I hope to accomplish. Because taking a statistics course is a pre-requisite for the class, all students have had exposure to the principles of data organization, measures of central tendency, measures of dispersion, standard scores, non-parametric tests, parametric tests, and correlation. However, it is surprising how little most students retain. This necessitates a comprehensive review of statistics in which I incorporate homework assignments using contemporary statistical software (i.e., SPSS 13.0) to enter, code, organize, and analyze data gleaned from their own responses to an established questionnaire or test. The hands-on nature of this approach solidifies their existing familiarity and distant recall of their statistics course.

The next part of the semester comprises discussions about measurement principles such as reliability, nomological networks, validity, and standard error. Classic test theory and item response theory are also integral parts of the curriculum. I have found that students, often times, understand these complex principles if they are working with them as we talk about them. This occurrence is where the research project ties their experience back to curricular information. The projects become a vital part of the students' learning and comprehension.

## Community Partners

To accomplish this type of project, several different types of community partners have become instrumental players. I have been able to develop cooperative and mutually beneficial partnerships with several test publishing companies (PAR, MHS, etc.). I contact the companies a few weeks prior to the semester and inquire about any ongoing data collection projects. They usually provide me a listing of instruments for which they are collecting norming, reliability, and/or validity data. The company typically has test-retest intervals and concurrent measures projects already designed along with specific demographic criteria and desired numbers of respondents in each category. After discussing psychometric principles of reliability, validity, standard error, and nomological networks, students in this class begin designing projects using some of these new instruments. According to PAR research and development specialists, they have 30-40 projects under contract at any given time at various stages of development (i.e., from data collection to internal reviewing, to printing). Their website http://www3.parinc.com/careers/pdfs/INFORMATIONFORDATACOLLECTORS.pdf details current data collection projects.

I encourage students to select projects that are related to a principle or topic in psychology that is of particular interest to them, and then go and do some reading on that topic. I instruct them to identify concepts or constructs related to those the new instrument is addressing, and then to attend to types of measurement issues they may encounter (e.g., how do you objectively measure self esteem with a paper and pencil test). As they develop expertise in the subject matter, often times, the students will come up with additional ideas for criterion or concurrent measures. I have found the publishing companies, after consulting with the authors of the instruments, to be very receptive to these new ideas.

Once students have committed to a project, the company provides all of the testing materials necessary (e.g., stimulus cards, test protocols, administration instructions, and scoring procedures) and technical support (e.g., manuals and computer programs) to complete the project. When test instruments are under very early development the company will use their experimental scoring programs and then e-mail the results back to students in a spreadsheet that is amenable to various types of statistical analysis. Very often, there is compensation for the numbers of completed and usable protocols the students collect. I put this compensation into a fund to purchase additional testing materials that we use in class demonstrations or in future research projects.

In addition to corporate partners, I have found that local community partners are also generally willing and eager to have students evaluate their programs. Students in this course have conducted a comprehensive assessment of a local truancy support center and participated in a county-wide health services needs assessment. Closer to home, students in this course have also assessed university programs. One student conducted a detailed assessment of the admissions criteria our university uses in relation to retention issues. At the conclusion of the study, the student and I made recommendations to the administration that influenced policy changes to the admissions process. Currently, a student is evaluating the impact of a newly organized women's center on

campus in meeting the needs of the campus community and plans are in place to assess the Career Services Center on campus. Directors and managers of these programs are always appreciative our students' work as well as the data and final report that the project produces.

## Conclusion

These types of projects are a lot of extra work for the students and for the faculty mentors. What makes the whole research project idea work, in my opinion, are three crucial factors. First, students must have the resources available to help them accomplish the task. This requirement means that as a faculty mentor, I am available to my students far more hours per week than the number of office hours required by university policy. It means that I choose to be responsive to student needs when planning my lectures and that I take time to review the issues and concerns students are having with their projects during class and in small, informal, and spontaneous research groups; many times in the student computer lab, in the hall, during a ball game, over coffee, or after an unrelated class. I also have financial resources available through course fees and through the above mentioned compensations from testing companies to purchase research and presentation materials. Our university provides students access to SPSS funded through general student fees and I have arranged reserved time during our class for computer demonstration, orientation, and ongoing instruction.

The second factor crucial to my implementing experiential research as a component of the assessment class is having a culture in which this type of activity is recognized and valued outside of the classroom. To be the most effective, such a culture should be an institutional endeavor and supported by the university in all ways. Our university is beginning to recognize and reward those who pursue these types of pedagogical activities. Recently the university commissioned a budgeted committee supporting undergraduate research endeavors. Faculty mentors are honored and rewarded accordingly (see Lynn White's chapter in this volume). However, nurturing and fostering this type of culture within the department or program can be possible even without formal recognition from the university as a whole. In our department, we have recognized for years that mentoring undergraduate research is within our primary purview. Each faculty member is active in mentoring undergraduate student research. Directing and mentoring these types of projects is supported in our departmental constitution and is rewarded through course reductions and Leave Rank and Tenure considerations. This level of support allows me to devote a great deal of time and energies to mentoring student projects without sacrificing potential for tenure and advancement.

A final requirement for successfully mentoring and fostering undergraduate research projects in the assessment class is having a meaningful forum for disseminating the results. We have found several local, regional, and national venues friendly toward and supportive of undergraduate research. In our department, we have an annual scholarship day toward the end of Spring semester. Students submit proposals that are reviewed by faculty. Students whose projects are accepted present either posters or oral presentations that are judged. Cash awards are made possible due to a generous contribution by a former faculty member. The University has more recently began to sponsor an annual, peer reviewed Student Faculty Scholarship Day with very similar parameters. Finally, professional organizations such as Rocky Mountain Psychological Association have been friendly toward undergraduate student research projects. Giving students a peer-reviewed forum where they can disseminate the result of their studies is the final piece in giving the project and their learning experience meaning and purpose. To date, my students have presented 28 papers at professional meetings in local, state, regional, and national forums detailing their scholarly work.

This brief discussion outlines my efforts in one class. As can be seen in this volume, there are myriad ways to initiate and foster a culture for undergraduate research in today's institutions of higher education. Developing and implementing undergraduate research projects in various classes helps to addresses the Boyer Commission's first and most important recommendation for improving American undergraduate education; "Make research-based learning the standard" (The Boyer Commission, 1998, p. 23).

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# Conducting Undergraduate Research: Independent Study

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Undergraduate independent research projects offer an exceptional opportunity to truly immerse students in the understanding of psychology as a science. Commonly students are required to take an Experimental Methods or Research Design course in their undergraduate training whereby they learn the fundamental principles of scientific investigation in psychology. Beyond this foundational course, many colleges and universities offer additional laboratory or research based courses in their curriculum. However, for many students, it is not until they have had the opportunity to engage in group or independent research projects that the application and understanding of research principles solidifies. Because the actual process of involving students in independent study should be tailored to the specific advisor and student pairing, this chapter will offer suggestions regarding broader issues of selecting students, planning and supervision of independent research projects, and benefits associated with independent study.

## Selecting Students

The process of selecting students to engage in independent study projects is perhaps not as challenging that selecting students for group research projects because the independent study project often does not take place until students are advanced in their undergraduate career and/or have had previous group research experiences, and it is often only the best students who engage in independent research project. However, as Katz, Sturz, Bodily, & Hernandez (2006) suggested, "teaching an independent study course is the ultimate service work," (p. 131), and thus faculty should consider selective criteria when identifying potential students. Katz and colleagues offer suggestions such as GPA requirements, recommendations from colleagues, and an interview process as a gateway to identifying students who would thrive doing an independent research study.

Burke and Cummins (2002) also noted the importance of compatibility between student and faculty advisor. The advice offered by Katz et al. (2006) and Burke and Cummins (2002) offer is very helpful and should be considered when considering selection of students to supervising in independent research projects. However, what if you are teaching at a school where all psychology majors are required to complete a senior thesis in the form of an independent study project involving research? Having such graduation requirement clearly negates some of the luxury of only "selecting the best."

At the institution where I teach, we require every senior majoring in psychology to complete a senior thesis. Students can choose whether they would like to conduct an empirical project or literature review. In the past five years, in addition to various personal and group research projects, I have supervised 17 senior theses, all of which have resulted in presentations at either small or large regional conferences, and in some instances, at national conferences as well. The topics for these senior theses have varied greatly (e.g., soap opera viewing and personal relationship attitudes/beliefs, personality characteristics of leaders, gender stereotype perceptions in preschoolers, elementary school-aged children, and college students, adolescent drug use and abuse, personality predictors of religiosity and conformity, the effects of violent and non-violent videogame exposure on gender characteristics). Few of these projects have been in line my own personal research interests, but because I have supervised these projects, I have become better-rounded in my knowledge of research in various fields of psychology.

Additionally, because of this graduation requirement, I have supervised both strong and marginal students, and although level of ability clearly plays a role in students' success with these projects, I have found that even marginal students can benefit greatly from independent research projects. In fact, because they are pursuing a project that is their own personal design, regardless of whether the project is empirical or a literature-review, many students rise to the occasion with appropriate direction.

Regardless of whether the project is required or optional for the student, faculty should interview potential research assistants as a part of the selection process. The interview can be a useful tool for examining compatibility between student and faculty advisor. The purpose of the interview is to examine whether the student's interests are aligned with the supervising faculty member's and to determine the possibility of an efficient and effective working relationship. Sample questions faculty should consider asking in the interview process include: Why do you want to get involved in research? What topics are you interested in studying? What are your expectations for time commitment to the project? What previous experiences do you have with research (e.g., course work in Experimental Psychology)? These questions will allow the faculty person to gauge the level of interest, desire, and interest fit in order to better decide whether to mentor the student through a research project.

## Planning and Supervision of Independent Research Projects

Once a student and faculty member have agreed to work together on a project, it is important that there first be a discussion of process, expectations, and direction of the project. This early interaction can include very general discussion without getting into specific details of the project. Important initial details to consider are: timeline for completion (e.g., one semester vs. two-semester project), expectations for frequency and duration of meetings, and objectives and requirements for completion of the project. After there is agreement upon these preliminary yet essential details, students and faculty can delve more deeply into the specifics of the independent study.

Burke and Cummins (2002) note "compatibility is important but needs a structure in which to flourish" (p. 130). Their suggestion of structure can be established in the context of planning and supervising the research project. There is a wide range in level of supervision faculty offer to students who engage in research projects. For example, some faculty let the student guide the project in its entirety (i.e., from topic selection to timeline for the completion of the project); whereas others are very directive and require students to follow outlined practice and procedure regardless of project type or design. Personally, I have found most success with a moderate approach of structure that includes weekly opportunities to check the progress of the project, tailored to the specific student and design of the project. Structure in this faculty-student working relationship allows the student to know what to expect, feel comfortable coming to the faculty person when in need, and provides the best opportunity for successful completion of independent projects.

McKeachie (1994) offers three suggestions to increase the chance of success within the context of independent study projects that all relate to process more than content:

1. Be sure the student has a clear question, problem, or goal. This doesn't mean that the goal will necessarily be clear initially, but McKeachie advocates monitoring students' progress in arriving at a goal that [represents a problem that] is meaningful for them.
2. Help students be explicit about the strategies they plan to use, about their time management, and how they will monitor their progress. This is a chance to get students to develop strategic learning [i.e., learning to develop and implement a strategy].
3. Have students compare notes and get feedback on their progress from fellow students. Producing an independent product can be anxiety producing. Peer support can be helpful both substantively and emotionally (p. 154-155).

Supervising faculty may desire early and frequent contact with the student as the project is developing, but as the independent research progresses, it can become less guided and more self-directed. In the planning process, it is useful for the faculty member and student to agree upon the nature of supervision necessary for the project. Katz et al. (2006) suggest a quasi-structured environment for supervising students conducting empirical projects; however also note the importance of tailoring "the level of structure to suit a student's individual needs and developmental level" (p. 133).

## Common Pitfalls and Warnings for Students and Faculty

Although few would disagree that the benefits of engaging students in independent research projects far exceed potential costs, it is important to briefly address common problems associated with student-involvement in independent study research projects. Beginning with topic selection and research design, students often fall victim (at least initially) to being interested in broad topics. Faculty should encourage students to pursue topics that are personally interesting, but encourage students to spend time reviewing existing literature on their selected topic. This literature investigation will help focus and realize a project that is do-able in the limitation of an undergraduate project.

In the early phases of meeting with my students, progress is often slow. After discussing initial

research interests, in the course of two to three weekly meetings, students are asked to engage in library research and share with me the results of their findings. In independent research projects, it is essential for students to take their time and refine what they would like to do given what research has been done previously.

Another potential problem students face is designing a study that can be completed in an agreed-upon timeline (i.e., often one or two semesters). When students conduct empirical independent research projects under my direction, I encourage them to see the project as a two-semester commitment. The first semester is spent finding a topic, developing a design, obtaining IRB approval, collecting, and analyzing data. The second semester is used for write-up, presentation, and pursuit of publication. I will still allow a student to use two semesters if he/she chooses to do a literature review independent research project, but often these types of projects are completed in a one-semester timeline.

In addition to student pitfalls, there are obstacles to overcome from the faculty perspective. With departmental, divisional, and college or university obligations, it often is challenging for faculty to engage a substantial number of undergraduates in independent research projects. This problem can be exacerbated when also supervising group research, and conducting your own personal research. Finding the "right number" of independent projects to supervise is a challenge, and largely consists of trial and error, but as noted in the next section, the benefit to the student, and vicariously for the faculty person is great.

## Benefits Associated with Independent Study

The process of independent study as a means of conducting undergraduate research projects is rewarding for both the student and faculty advisor. Because admittance into graduate school is a concern for many students, independent research involvement is one way for students to set themselves apart from other applicants and impress graduate program admittance committees (Landrum, Jeglum, & Cashin, 1994). This possibility is even greater if the student has followed the project through to presentation and publication (Landrum, Davis, & Landrum, 2000). Working on an independent project with a faculty member also gives students the opportunity to be mentored in their professional development and ultimately can result in a good letter of recommendation for the students as they apply for graduate school or reference for job applications.

Another benefit of students' doing independent study is further development as researchers within the field of psychology. Kardash (2000) explored students' and faculty mentors ratings of skills pre and post undergraduate research experience. Students noted significant increases in many and diverse skills such as: making use of scientific research literature (e.g., journal articles), identification of specific questions for investigation, formulation of research hypotheses based upon specific questions, designing of an experiment, observing, collecting, and analyzing data, and writing a research paper for publication (see Kardash, 2000 for complete listing). Similarly, Ishiyama (2002) noted students' perceptions of benefits of research involvement including "(1) think analytically and logically; (2) put ideas together; (3) learn on their own" (p. 380).

Although the gain may be greater for students, faculty too can benefit from supervising independent study projects. As stated previously, independent study often involves students investigating topics that are of particular interest to them specifically. Consequently, faculty may be asked to stretch beyond their specific area of expertise. I firmly believe this stretch is beneficial to us as faculty because it forces us to become knowledgeable in topic areas that are beyond our comfort zone and it also demonstrates to students an investment in their research and models the scientific pursuit of knowledge.

## Summary

Student involvement in independent study research projects offers great opportunity for one-on-one collaboration and development of students as professionals within the field of psychology. Although supervision of independent research can initially be time consuming (depending upon the level of skills and ability of the student), Burke and Cummins (2002) remind us of the intrinsic rewards associated with this endeavor such as "watching a student grow, develop, and mature into a trusted and respected colleague" (p. 131). After having supervised many independent research projects, some of which were required others elective, I have found the process to be tremendously rewarding and worthwhile. What I value most in independent study research is the collaborative interaction between faculty and student, whereby there is an increased opportunity for more personalized teaching of skills that frequently involves mentoring. As a result, the intrinsic reward I have experienced is witnessing the development of students' ownership of process, product, and education.

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# Toward a Model for Undergraduate Research in Psychology at the Two-Year College

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***Collin College***

Research at the community college level is a nebulous concept. Clearly, faculty members are expected to remain abreast of the current research in their respective disciplines, and yet the pressure to conduct original research and publish is generally not present for tenure or recurring contracts. In addition, a number of structural differences between community college and university environments, such as student body composition, approved courses and funding, make programs of research by community college faculty and students particularly challenging, but not impossible, to achieve.

The first concern stems from the profile and transient nature of the community college student. Currently, community colleges serve approximately half of all incoming freshman students, and while overall 29 percent of freshman require remediation courses (Hansen, 1998); this figure is often over 50 percent at the community college level (Collin County Community College, CCCCD, 2006). Attrition is another significant concern. Whereas major universities may experience 20 percent attrition of freshman, these figures are significantly higher in the community college environment. Finally, consider that the mission of the community college is to have students who ideally leave within two years, either as transfer to four-year campuses or with a terminal degree or certificate. Thus, the timetable for student preparation at the community college means programs of research must be both accessible and structured.

An additional significant difference between the two-year and four-year campus is that the two-year approved curriculum in psychology does not generally include courses in statistics or research methods. These are often the very undergraduate classes from which university faculty may draw their more promising prospects for mentoring. This limitation also means that a two-year program will need to provide external and informal instruction in these critical areas.

Finally, there is the hurdle of funding. Although there are certainly advantages to faculty at community colleges in terms of not being tenure-dependent on grant funding, there is also concomitantly a less grant-friendly culture on two-year campuses, and faculty pursuing such interests may have little in the way of institutional support and most likely do not have the prestige associated with a university campus that can be an integral factor in external funding. Thus, not only is the ability to conduct research compromised by a potential dearth of resources, but the monies for travel to professional meetings may be quite difficult to access.

Though the above challenges can be daunting, research with undergraduate students can be a very rewarding experience. The sections below outline possible avenues for community college faculty considering sponsoring a program.

## Formation

If possible, found the research group through a legitimate organization. For example, an avenue open specifically to psychology programs is through an honor society, such as Psi Beta, the sister honor society to Psi Chi (the National Honor Society in Psychology for four-year college/universities). Psi Beta National Honor Society provides "professional development of psychology students in two-year colleges through promotion and recognition of excellence in scholarship, leadership, research, and community service" (Psi Beta's National Council, June 9, 1996).

Typically, honor societies at two year colleges serve the purpose of recognizing students for academic commitment and high grade point averages, as mentioned above, but true research opportunities remain elusive. Although a founded honor society of any campus will function in the standard manner befitting an honorary society of this nature (e.g. providing a venue for community service and social interaction), it is through the research component that the organization will excel in affording students opportunities less frequently encountered by undergraduates, particularly those attending community colleges.

## Mentoring

Although not all students involved in the research program will be psychology majors, the majority will be. Therefore, affording available research opportunities under the supervision of a skilled researcher is especially crucial for those students who wish to pursue psychology as a career. A majority of admissions requirements for graduate study in psychology emphasize undergraduate research, and yet opportunities in the university environment may be less available to underclassmen than graduate students. Thus, community college faculty represent a conduit for future student success not only by promoting an awareness of the expectations for further study, but also by facilitating research activities.

Community college professors with a desire to provide mentoring to undergraduate psychology students face unique challenges in trying to engage students actively in research. Often, students do not acknowledge the necessity of accomplishment beyond their coursework, of devoting more than the bare minimum time in their education. When combined with heavy commitments to their off-campus work, families and regular course work, the outcome is that many students do not connect with each other, get to know their faculty or even participate in professional organizations. These eluded development opportunities are also exacerbated by the transitional nature of the two-year college community.

Despite these adversities, research reiterates the positive effects of mentoring for this population. Community college students who are mentored report increased self-esteem, motivation, academic performance and also self report significant increases in measures of internal locus of control (Hoffman & Wallach, 2005). The authors want to underscore the salience of mentoring to the success of the research program proposed.

## Proposed Structure

### *Recruiting of Students*

Begin by recruiting students who are active honor society or psychology club members, psychology majors, as well as those who exceed expectations in courses and would particularly benefit from the enrichment opportunities afforded by research.

### *Orientation*

Students who commit to the program are first introduced to an overview of research and its significance to the foundation of the science of psychology by faculty sponsors. The relevance of research in expanding psychological knowledge is emphasized, followed by a discussion of the importance of research in admissions decisions to graduate education, as doctoral programs consider research experience as one of the top criteria for selection- following the personal interview (Norcross, Hanych, & Terranova, 1996). An overview of realistic time obligations to the program and the significance of student commitment to the success of the overall experience is also suggested.

### *Topic Selection*

Several broad categories of interest are introduced typically at the meeting following orientation. Students are encouraged to self-select into groups by subject of greatest interest. For example, topics may include: sports, sexuality, dreams, memory, and other areas that engender the interest of undergraduate students. By keeping the categories broad, a mentor both facilitates a small degree of focus while allowing students the latitude to craft a specific research design. Occasionally, an enthusiastic student will suggest a novel topic that is cultivated and invested in either as a group or individually.

### *Group Formation & Research*

After topics are selected, natural small groups of two or three are usually formed. The fundamentals of behavioral science methods are covered at this time, and then students are mentored through the actual research process. Specifically, students generate original research questions and conduct literature reviews to enable the formulation of appropriate research hypotheses. Where applicable, students then devise research instruments, gather data, analyze results and organize findings for presentation.

### *Planning a Timeline*

Emphasize to students that in order to complete a project, a weekly commitment will be critical, and then have students compare schedules to determine an optimal weekly meeting time. By setting this at the beginning, the nontraditional student is able to make arrangements as necessary to be able to commit to the group. Next, set a reasonable timetable.

Consider the particular needs of the campus population and outline a schedule that allows time for brainstorming, library orientation and use of online databases, refinement of the research question and the steps of the research process.

### *Networking/Conference Opportunities*

Students attend various professional conferences to present the results of these research endeavors, atypical for community college students. For example, many of our students have presented at regional psychological association conventions, local psychology conferences and undergraduate research conferences (see Figure 1).

### *Publishing Research*

Ultimately, publishing student research is a goal/outcome of the program. Psychology journals, typically those journals designed specifically for undergraduate research are pursued, which include, but are not limited to: *Undergraduate Psychology Journal*, http://www.studentgroups.ucla.edu/upj, *The Psi Chi Journal of Undergraduate Research, Journal of Psychological Inquiry* and the *URC Undergraduate Research Journal.*

### *Institutional Support*

One of the primary concerns with a program of research at a community college centers on the question of funding. Unlike university psychology faculty, who often have access to start up funds or established labs, community college faculty must create funding streams in an environment in which research costs may not yet be part of the campus culture. Successful funding under these conditions entails diligence, innovation and accountability.

It is unlikely that administrators will wholeheartedly and unreservedly agree to fund faculty and student research and travel expenses without an assurance of positive program outcomes. Thus, faculty must be creative in considering possible avenues for expenses related to research and professional presentations. On some campuses, faculty may petition student services for allocation from accounts generated by a student activity fee.

Another possible source of revenue is through self-published materials. If a department is using a campus-based lab manual or other ancillary material, often the proceeds are directed to the department in a discretionary account. Consider enlisting support from departmental colleagues in having monies employed to this end. If this is not possible, general fundraising activities may be needed to provide initial resources.

No matter the source, a clear and detailed budget is essential, as it is a justification for research and travel expenditures. Pare down the budget to include only items necessary to complete a project (e.g., copies of surveys, assessment tools, or statistical software, and keep travel expenses limited to modest transportation, lodging and registration fees). Good recordkeeping will make the program more attractive as a line item in a department after the efficacy of the program has been established.

Once the program is underway and there are positive student outcomes, such as presentations at student conferences, consider developing a proposal for departmental or division support. Provide concrete measures of success similar to the chart below that assure the dean and other administrators of the prudence of supporting student research. Be sure also to highlight recognition for the institution brought by the student's successes, such as newspaper articles or any awards. By stressing the positive reflection on the college, the proposal can legitimize the costs by demonstrating the exchange for both students and the institution.

## Conclusion

Despite the unique difficulties inherent to conducting student research at the community college level, the challenges are in no manner insurmountable. Indeed, overcoming some of these barriers can promote an even more gratifying experience and sense of accomplishment for both students and faculty. With institutional support, an organizational umbrella, adequate pre-planning and structure, community college faculty can offer their students the opportunity to explore the process of research or even to begin their research careers. Faculty, simultaneously can enjoy the benefits brought by these academic pursuits, which serves to enhance their teaching and professional development.

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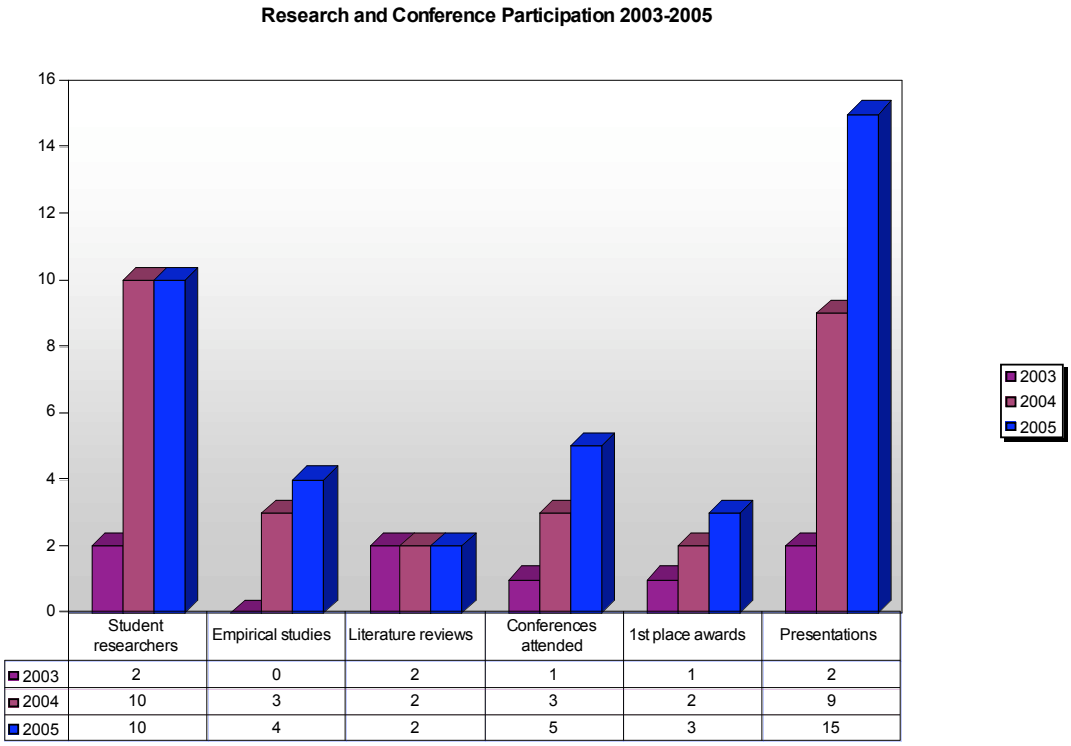


| | Student researchers | Empirical studies | Literature reviews | Conferences attended | 1st place awards | Presentations |
|---|---|---|---|---|---|---|
| 2003 | 2 | 0 | 2 | 1 | 1 | 2 |
| 2004 | 10 | 3 | 2 | 3 | 2 | 9 |
| 2005 | 10 | 4 | 2 | 5 | 3 | 15 |

***Figure 1:*** **Collin County Community College Students' Research and Conference Participation**

# Involving Students in Research at a Commuter College

**Vincent Prohaska**

***Lehman College, City University of New York***

The obvious distinguishing characteristic of a commuter college such as Lehman College, the City University of New York, is that all of our students live off campus. Immediately, this makes the forging of any sense of community extremely difficult. Writing about commuter students for an article in the *Chronicle of Higher Education*, Lipka (2007) reported that George D. Kuh, Director of the National Survey of Student Engagement (NSSE) referred to commuter students as "less engaged, less satisfied, and more likely to drop out" (p. A31). For most commuter students, the idea of the college as a meeting place, a "home" where students spend time, make friends, and "hang out," simply does not exist. Instead the college is where they go, when they must, to take classes. The majority of their lives are elsewhere.

But there are other differences as well: Lehman College's undergraduate students in fall 2006 tended to be older than "traditional" college students (20% were 35 years and above, only 34% were between 19 & 22 years), overwhelmingly minority (48% Hispanic, 33% African American, 10% White), and of low socioeconomic status (80% receiving financial aid). In addition, often they are parents, work full-time, started college elsewhere (sometimes a long time ago), and frequently seem to not have had prior good experiences in college. Thus, our students tend to focus on immediate career possibilities and short-term goals. They generally are in a rush to graduate. It seems that in their eyes, they need a degree to move on with their lives. Furthermore, their immediate family and friends tend not to be college graduates and are even less likely to possess more advanced degrees. Thus, for many if not most of our students, family and friends are not going to be supportive of their spending more than the minimum time on campus, especially when that time is spent on something as abstract as "research." Family and friends tend to be much more supportive of spending non-class time on "real work" or on activities with them.

Yet faculty know that research experience is critical for acceptance into graduate programs: Norcross, Kohout, and Wicherski (2006) analyzed admissions information from almost 80% of the psychology graduate programs in the U.S. and Canada and found that research experience was rated as highly important for both masters and doctoral programs. Perhaps not surprisingly, doctoral programs actually gave research experience a higher rating than master's programs did. Similarly, Walfish and Turner (2006) found research experience to be the 4th highest rated criterion, ahead of overall GPA, for acceptance into doctoral programs in Developmental Psychology. It is now common for articles advising students about applying to graduate schools to stress the importance of research experience (e.g., Cynkar, 2007; Schoeneman & Schoeneman, 2006) and students themselves acknowledge it (e.g., Grover, 2006; LaRoche, 2004; Purdy, 2005). Research experience also is important in preparation for the job market (Sleigh & Ritzer, 2007).

Given the obvious importance of research experience, how does one successfully involve nontraditional, commuting students? Few guides exist. For example, when Ocampo et al. (2003) reviewed 2,029 articles on diversity published in the journal *Teaching of Psychology* between 1974 and 2002, they found that only 3% concerned nontraditional students and none focused on socioeconomic status. In one study explicitly focused on nontraditional students, Chartrand (1992) used a self-report questionnaire to examine factors affecting their intention to continue their studies. She found degree of certainty in their choice of majors and support from family and friends to be important factors; however, finances, hours of employment, and family responsibilities, were not important factors. Articles concerning factors involved in ethnic minority student success tend to focus on issues of adjustment to being on predominantly majority campuses (e.g., Gloria, Castellanos, Lopez, & Rosales, 2005; Reid & Radhakrishnan, 2003; Thomason, 1999; Walton & Cohen, 2007). In one study that did survey students on diverse campuses, Santos, Ortiz, Morales and Rosales (2007) found that

the strongest positive dimension among African American, Latino, and Asian students was a sense of belonging.

## Recruiting Students into Research

As the profiles of nontraditional students and Lehman College students in particular suggest, getting these students interested and involved in research carries unique challenges. Even many of those with the desire and capability to pursue graduate studies in psychology do not know how important research experience is to that goal. Targeting these students is a department-wide priority. Students need to hear continually in their classes about the importance of research and about research opportunities available. We post information about faculty research projects in the hallways, on the web, and include it in a department brochure. An active chapter of Psi Chi, The National Honor Society in Psychology, helps to reinforce these messages. Psi Chi's magazine, *Eye on Psi Chi*, often contains articles about student research and its importance in graduate school admissions (e.g., Grover, 2006; La Roche, 2004; Norcross, et al., 2006, Purdy, 2005; Sleigh & Ritzer, 2007; Walfish & Turner, 2006). The goal is to create an atmosphere within the department that being involved in research is something expected of students planning graduate studies.

One of the best ways to recruit students is through one's classes. First-hand observation of a student's work habits, intellectual curiosity and maturity are invaluable aids to selecting students who will be successful research assistants. However, another hallmark of commuter colleges is that a large number of classes are taught by part-time faculty. Thus, developing a culture in which faculty, including adjunct faculty, continually refer students to those with active research projects is important.

## Helping Commuter Students Find Time for Research

Once students become interested in research, helping them to find enough time in their schedules to do that research is another major challenge. Here is where funding, either external or internal, can be critical. Optimally, enough funding should be available to allow students to leave their regular part-time jobs or to pay for child care while they work on their research. Our students have been funded through such institutional mechanisms as the *Minority Access to Research Careers* program (MARC) under the National Institutes of Health (NIH), the *Minority Research Infrastructure Support Program* (M-RISP) under the National Institutes of Mental Health (NIMH), the *Alliance for Minority Participation in the Sciences* (AMPS), under the National Science Foundation and the *McNair* program under the Department of Education.

Another avenue to support research time is course credit through Independent Study and Honors Research courses. Because our students often are interested in the fastest route to graduation, opportunities to gain more credits are attractive, but we have to be sensitive to whether this option is actually creating more time. Allowing students to increase their semester course load from 15 to 18 credits by adding research based independent study courses might not be effective in freeing time for research. Sometimes highly talented, motivated and interested students simply cannot make sufficient time in their schedules for research.

Clearly it is best to recruit students to research early in their academic careers; however, this practice becomes problematic when so many students arrive in their junior year as transfers. Thus, students' involvement in research projects must be weighed against their anticipated time left at the college. Although students can make real contributions in as little as a single semester, expecting students to start and finish a research project in one semester often is unrealistic.

## Conducting Research Projects

The time factor creates two distinct types of student involvement in research projects: Some students, mostly those recruited early, participate in all aspects of the research, from design, through data collection, all the way to analysis and presentation or even publication of the results. These students might even pursue their own independent research projects as well. Other students, however, participate, as their time allows, on more "multigenerational" projects. They might work on data collection and analysis for a project already designed. Or they might have responsibility for a single experiment of a multi-experiment project. Some students who work on a project might even graduate before the entire project is completed.

In working with both groups of students, clear sets of goals are important, principally because of the time factor. Commuting students are continually juggling their commitments, taking time from task A to do task B. Thus, clear time requirements, work expectations and objectives are essential to keep the students focused and to keep work progressing. Regular meetings with clear foci are essential (e.g., to

discuss the results of a student's search for relevant literature, to review summaries the student has written of articles read, to plan a schedule for data collection, to monitor data collection and identify unforeseen problems, to plan analyses, to rehearse presentations). It is important to remember that students are sacrificing time from other important activities to do research. Thus, their time should be used effectively.

Group meetings can be efficient if the students are working on aspects of the same research project. However, it might be difficult to find a time when everyone can get together, so it is more likely that faculty will work with students individually. I have been finding email an important asset in this area. More and more my students and I communicate this way, "discussing" problems or new leads, or just staying in touch to maintain momentum.

It should be noted that staying abreast of student progress is not the same as micromanagement. It is important that students develop the ability to work on their own, and have sufficient time to wrestle with unanticipated problems and difficulties. However regular contacts can be very effective in moving the project forward and keeping students from feeling lost or overwhelmed.

Building a sense of community among commuting students involved in research projects with different faculty is difficult, but important. Peers can be sources of assistance when students get stumped by difficult readings or analysis questions. Being more mature than traditional-aged college students, our students tend to be more concerned about "wasting" a professor's time with too many questions or creating a poor impression of their competence. This concern makes them more likely to seek help from fellow students rather than running immediately to their faculty mentor. As students are not likely to see role models among their families and friends, it becomes important that their involvement in research does not make them feel isolated from other students as well. For several years, our department maintained a computer laboratory that was supervised by members of our Psi Chi chapter and available to all students conducting research and to Psi Chi members. This facility was a great advantage in building camaraderie and providing a sense of "home" on the campus. Unfortunately we recently were forced to give it up and our student research productivity has suffered. We are currently seeking to reinstate a similar facility.

Other models for conducting research can be found in Karukstis and Elgren (2007). The Council on Undergraduate Research (CUR) and its publication, *The CUR Quarterly*, also can be excellent resources.

## Acknowledging Student Success

Student involvement in research should be celebrated publicly for several reasons. First, and probably most important, is because research is difficult. Students who have risen to the challenges and sacrificed the time and effort required to complete their research projects deserve special notice. We often publicly display student posters. Students who complete honors research projects are acknowledged publicly at a post-commencement reception. Students who receive Psi Chi Regional or National Research Awards, or other awards are often featured prominently on the College web site.

Another reason to publicize student research is to show the students' family and friends that their research work is important and acknowledged. A listing on the College web site, mention in the local newspaper, certificate from an "external" source, all serve to demonstrate that research involvement is seen as a "big deal." Students currently involved in research can point to publicity about former students as a way to legitimize their activities, to explain why they are spending so much valuable time on campus.

Finally, publicity is an important aid in recruitment of new students into research. As noted earlier, creating an atmosphere that expects student to be involved in research is critical. By consistently reminding students that there are tangible gains to their research involvement can help to attract new students. Indeed, it may even do more. Recently Walton and Cohen (2007) suggested that one of the barriers to minority students' pursuit of careers in science was that they had difficulty seeing themselves as belonging in those fields. Minority students who were reminded how few students like them were enrolled in specific science majors were less likely to see themselves in those majors as compared to students who were not explicitly reminded. In a follow-up intervention study, African-American students who were given information designed to normalize their doubts about belonging in college, that is, to show them that all students share some of the doubts they were experiencing, increased their sense of belonging and their engagement in activities such as studying (there also was some evidence that their GPA's improved as well). Creating an environment in which students see the successes of students like them might also help to convince them that graduate school and professional careers are real possibilities.

## Closing Thoughts

Although many of the challenges in successfully involving the commuter student at Lehman are the same as involving more traditional students at traditional institutions, many are different. With our students, it is especially important to remember that factors outside our or our students' control will occur: family members will become sick or even die, children will need more attention than planned, apartments will burn, and students with terrific potential will find it impossible to engage in research. But because their involvement is research can be critically important to their futures, the efforts are well worth it.

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# Summer Research Programs

**Holly E. Tatum & Beth M. Schwartz**

***Randolph College***

Randolph College, located in Lynchburg, Virginia, was founded in 1891 as Randolph-Macon Woman's College. Randolph College began admitting men for the fall of 2007 and is currently a coeducational, liberal arts, United Methodist-related college offering 28 major programs, with 95 faculty and approximately 750 students from over 40 states and more than 40 countries. In the state of Virginia, R-MWC tops all private colleges and all but one public college in the percentage of students who earn a Ph.D. The psychology curriculum emphasizes a research-based experiential approach to the study of psychology. Students are introduced to research early on with a two-semester course on statistics and research methods and design. They then complete a 300-level course with a laboratory and finally, complete a two-semester research project during the senior year. A detailed history and full description of the psychology department at Randolph College can be found in our chapter entitled *Senior Thesis/Capstone Approach*, this book.

The Summer Research Program at Randolph College began in the summer of 2000 after a group of faculty submitted and received a grant from the Jessie Ball duPont Fund to support a campus-wide student-faculty summer research program. After three years of partial funding through the duPont Fund, the College was able to fully endow the program through alumnae gifts and individual donations. The program objectives include: building academic confidence among students, strengthening student-faculty relationships through collaborative work, broadening knowledge about diverse research methodologies utilized in various disciplines, developing students' writing and oral communication skills and encouraging enthusiasm for research and scholarship throughout campus. Faculty members and students from all disciplines are encouraged to apply for the program. Faculty who have received outside grants from Virginia Foundation for Independent Colleges (VFIC), NSF, and the Virginia Department of Education have been allowed to participate in the program as well. They have been able to utilize the structure of the program for their students, even though the funds come from another source. Or, if their funds do not include a stipend for a student research assistant, then they are able to apply to Randolph's program for partial funding.

For the past seven years, projects have originated out of the natural sciences, social sciences, and humanities with faculty from English to Physics involved in collaborative work with students. In the past seven years, almost 90 projects have been funded, which is approximately 11 each year. This program consists of an 8-week commitment that includes active research experience, lab and field work when appropriate, student presentations on research progress, weekly multidisciplinary seminars with speakers from within and outside the college, as well as social events for faculty and students. Both faculty and students receive a stipend for the 8-week period as well as a budget to support the scholarship. Funds from the budget are used in various ways including buying equipment and materials, covering travel expenses to collect data, or even paying research participants. Additional financial support is available for student travel to conferences to present their research. During the summer research program, students live on campus and pay a nominal fee for their housing.

At many institutions, summer research programs for undergraduates are offered primarily in the natural sciences with experiences limited to biology, chemistry, technology, engineering, mathematics, physics, health and medicine. Some programs such as the ones at University of Oregon and Case Western Reserve are offered only to minority students. Programs for minority students may have been initiated due to evidence that faculty-student research collaborations are a particularly effective aid in the retention and persistence of minority undergraduate and graduate students (Nagda, Gregerman, Jonides, von Hippel, & Lerner, 1998).

Many of the summer research experiences in psychology, including the programs at Buffalo State College and Western Kentucky, are ongoing projects funded by external entities such as NSF and NIMH. The summer research program at Randolph College does not rely on the availability of outside grants as do many other research programs around the country. In contrast to these programs, faculty and students

from any discipline at Randolph can participate in the program.

A unique aspect of the Randolph College research program is that proposals can initiate from students, faculty, or both. A student may have a research interest and find a faculty member with whom to collaborate or a faculty member may ask a student to collaborate with him or her on an ongoing or new research project. A faculty member can request two students if the project is large enough to necessitate more than one student. In the application process, students and faculty identify their roles in the project and the goals they will accomplish. A time frame for project completion is required but the program committee does not expect an entire project to commence and be completed during the 8-week period. In fact, some students use the summer research experience to initiate a senior research/capstone project that will continue into the next academic year.

A committee comprised of faculty and administrators evaluates the proposals focusing on how significant the research experience will be for the student's intellectual growth. It is expected that students will have a meaningful research experience within the chosen discipline during the 8-week program. Proposals are due in early February and decisions are made by March so that students can make their summer arrangements.

The following information is used in the assessment of the Randolph College Summer Research Program: number of students in the program, diversity of departments represented, number completed projects or projects which expanded into the next academic year, number of external presentations, growing demand among students and faculty for inclusion into the program, and joint student-faculty publications. In the coming year, additional assessments of Randolph's summer program, such as the ones discussed in the next section, may also be implemented.

## Benefits of Summer Research Experiences

Both faculty and students benefit from the summer research program. The summer research program provides students and faculty with the time required to investigate a particular topic in-depth without the additional academic commitments that occur during the regular semester. In addition, the program allows students the opportunity to experience the mentoring relationship present in graduate school. Many summer research participants at Randolph College have gone on to present their scholarship at regional and national conferences. One hundred percent of students who have participated in the Randolph College summer research program have remained at the college. This is consistent with research that has shown student-faculty research partnerships affect student retention (Nagda, et al., 1998). For faculty at a small liberal arts college where teaching is the priority, the resources available during a summer research program can be essential for productivity in scholarly activities.

Although research experiences for undergraduates have been long hailed as beneficial, the assessment of these experiences has only recently been addressed in systematic ways. David Lopatto, Professor of Psychology at Grinnell College, identified three key findings among summer research participants at four liberal arts colleges (Lopatto, 2003). First, participants reported that they developed expertise in their chosen field including learning about a topic in depth and understanding the research process of the discipline. Second, students who worked collaboratively with a mentor benefited the most from the research experience. In addition, working with peers increased reports of satisfaction and gains in the ability to collaborate and show leadership. Third, students who had the opportunity to learn through example from their mentors rather than working primarily independently or following the mentor's orders were more satisfied with the research experience. In interviews with 76 summer research participants at the same four liberal arts colleges, Seymour, Hunter, Laursen, and DeAntoni (2004) concluded that undergraduates gain from their research experiences in the following ways: an increased confidence related to conducting research, increased knowledge and skills, identification or confirmation of future career and educational plans and preparation for those plans, and increased positive attitude toward responsibility, learning and working.

Lopatto (2004) surveyed 1,135 summer research participants at 41 colleges about their summer research experiences using an online assessment tool, the Survey of Undergraduate Research Experiences (SURE). The highest rated items on the survey included understanding the research process in the field, understanding how scientists work on real problems, and learning laboratory techniques. Participants also reported a high satisfaction level with both the research experience and the mentoring relationship. A small number of summer research participants included in the study were conducting research in the social sciences. It is logical that many of the benefits identified in the summer research programs in the sciences would also exist for those studying psychology.

## Summer Research in Psychology

The summer research program is a natural extension of the psychology curriculum at Randolph College and all of the full-time faculty members in the department have participated during the seven years the program has existed; in fact, most have participated numerous times. There have been 13 psychology projects funded in the past seven years with 17 students participating. Half of the faculty-student collaborations have resulted in presentations at national conferences including the Society for Neuroscience, Society for Research on Child Development (SRCD), Association for Psychological Science (APS), American Psychology-Law Society (APLS), and Undergraduate Research Posters on the Hill sponsored by CUR. One psychology student whose project began during the summer research program won the Psi Chi Undergraduate Research Award. In addition, other students have been recognized at the Virginia Psychological Association for Best Undergraduate Research Paper.

Topics investigated in collaboration with students include: an inventory and history of the R-MWC antique psychology lab equipment collection which included a trip to Psychology's national archive; creating an environmental audit for greening the campus, the use of drawing to enhance children's memory, the role of humor in health and illness, and the effect of drugs on memory in rats in the sand maze. Several of these projects are also in the process of being written up for publication.

## Conclusion

In summary, developing a summer research program for undergraduates at a college or university has multiple benefits for the students, faculty, and institution. This type of program helps to build community among faculty and students. The students learn from their faculty mentors as well as from each other. They are exposed to a variety of research approaches among different disciplines. In addition, everyone in the college community is invited to the final presentations at the end of the program. The experiential learning that takes place in the summer research program is an integral part of the liberal arts tradition at Randolph College.

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# Managing Student Research Ideas with a WWW Database

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Research methods classes emphasize the design and conduct of research. Just as important, however, is finding and selecting a suitable research problem, especially in curricula that emphasize student research. Discussing nascent, potential research ideas in class may be difficult for some students. Allowing today's computer-savvy students to think up and submit their ideas outside of class first is an attractive solution. Additionally, instructors who must manage a classroom's worth of student research ideas need help too. With these criteria in mind, I designed and implemented a password-protected, Web database for my research methods classes.

Finding a research idea is the first step in conducting research. Surprisingly little research exists in this topic and whereas most textbooks in research methods mention the importance of generating research ideas, few emphasize it. However, McGuire (1983) argued the importance of discriminating between important and unimportant research problems. He suggested techniques to help students and others distinguish between these two types of problems. Later, McGuire (1997) suggested over 40 heuristics that teachers could use in order to promote student generation of research problems. For example, he suggested "extrapolating from similar problems already solved" (p. 8) and "shifting attention to an opposite pole of the problem" (p. 15). Langston's (2005) laboratory manual, too, addressed the issue of student generation of research ideas using a wide variety of psychological approaches and methodological techniques. Levens (2006) suggests that researchers should look beyond their core subject (social psychology, in his case) to other disciplines such as history, anthropology, and political science in their search for researchable ideas. McKenna (1995) suggests using local contexts (e.g., schools or daycare centers) as inspiration for student research ideas. Spatz and Kardas (2008) suggest that students read previous research to find topic ideas and relax in their search for an idea, which ultimately will help them feel good about their projects. Thinking of research ideas is hardest in early career, they point out. Eventually, research ideas will come.

Although idea generation is challenging for students, developing their ideas can be a problem for professors. In my department's curriculum, students enroll for a three-semester methods sequence consisting of Statistics, Research Methods I, and Research Methods II. In the Research Methods I course, students must come up with a personal research idea and write a prospectus. In the Research Methods II course, they must actually carry out and report their research. As classes became larger, I had more difficulty managing these student projects. In response, I turned to a Web database as a solution.

## The Web Database and Its Use

I created and served a FileMaker Pro database containing fields for names, semester, research ideas, hypotheses, variables, and instructor comments in 2000. The server version of FileMaker Pro that I use allows for unlimited numbers of users to access the database and costs more than the single-user version. The database has its own domain name (bssdb.saumag.edu:591) assigned by the university and is served on an older model iMac computer. Access to the database is restricted by password that is given to students in class.

I accomplish several goals using the database. The first is that students now have a place to submit their research ideas at a time convenient to them. The second is that I can monitor their submissions and remind students who are in jeopardy of missing the deadline to get their ideas in. Third, the database makes it very easy for me to provide feedback to students about their ideas outside of class time. Finally, the database also proves itself to very useful when the time comes to write letters of recommendation. Finding a particular student's research project is easily done and serves as good focal point for such a letter.

## Student Use of the Database

Students enrolled in Research Methods I are required to submit at least three research ideas by an

early deadline and later pick one idea to develop into a full-blown prospectus that is due by the end of the semester. The database comes with its own help page. I refer questions from novice users to this help page first. In class, I teach them how to use the database, to enter, edit, search, and sort records. I also urge students to use the database as a source for inspiration. The ideas already on the database came from students like themselves and, thus, those topics will likely be of interest to them too.

After the submission deadline, I display the database in class showing everyone their classmates' ideas. I remind them that their ideas will not appear publicly on the World Wide Web but that their classmates will see their names and ideas. By providing a class password (instead of individual ones) I hope to foster a sense of ethics and collegiality. In other words, the database is theirs and they should respect the people who use it and the ideas it contains. I have not had any security problems or need to change the password since I set up the database.

Periodically, I display the database in class and call on all students individually to report their progress and respond to my questions. For example, I might ask how many references they have found, whether they have requested articles using interlibrary loan, or about the articles they have read thus far. The database keeps track of when they last updated their records, thus I can also display who has been interacting with the database recently.

## Managing the Database

There is not much time or effort involved in managing the database once it is created and served. I ask students to notify me should they not be able to access the database because inability to access is an indication that the computer serving it has crashed. That computer has been fairly reliable and only crashes once or twice a year. I take care to back up the contents of the database several times a semester. No data has been lost, even after crashes. Every semester, I reset the field that keeps track of the semester and add a new set of Research Methods I students to the database. I also update the class field, promoting Research Methods I students to the next class and placing Research Methods II students into the "done" category.

The database currently contains 555 individual records, each containing up to three ideas (see Figure 1). A search of common words in the title fields revealed that the word "student" appears 193 times. The word "child" had the next largest total with 91 hits. "Sex" appears 64 times, followed by "women" (52), "men" (35), "gender" (34), and "religion" (29). "Divorce" (20), "race" (18), "traditional" (13), "pregnancy" (11), "athlete/athletic" (10) followed. The last words searched were "obese/obesity" (4), "prison/prisoner" (3), "bipolar" (2), and "terror" (1). The database's contents reveal much about what students are thinking about in terms of research ideas.

## Conclusion

The database approach is useful for faculty supervising multiple student research projects simultaneously. It is also useful for students, especially as a way to submit their first research ideas in private. Faculty who wish to set up similar technological solutions to the problem of generating research ideas can do so using a variety of products on nearly any type of computer. Similar database products include Access, MySQL, or PostgreSQL. The costs of creating databases for managing student research projects are greatly outweighed by the benefits and rewards.

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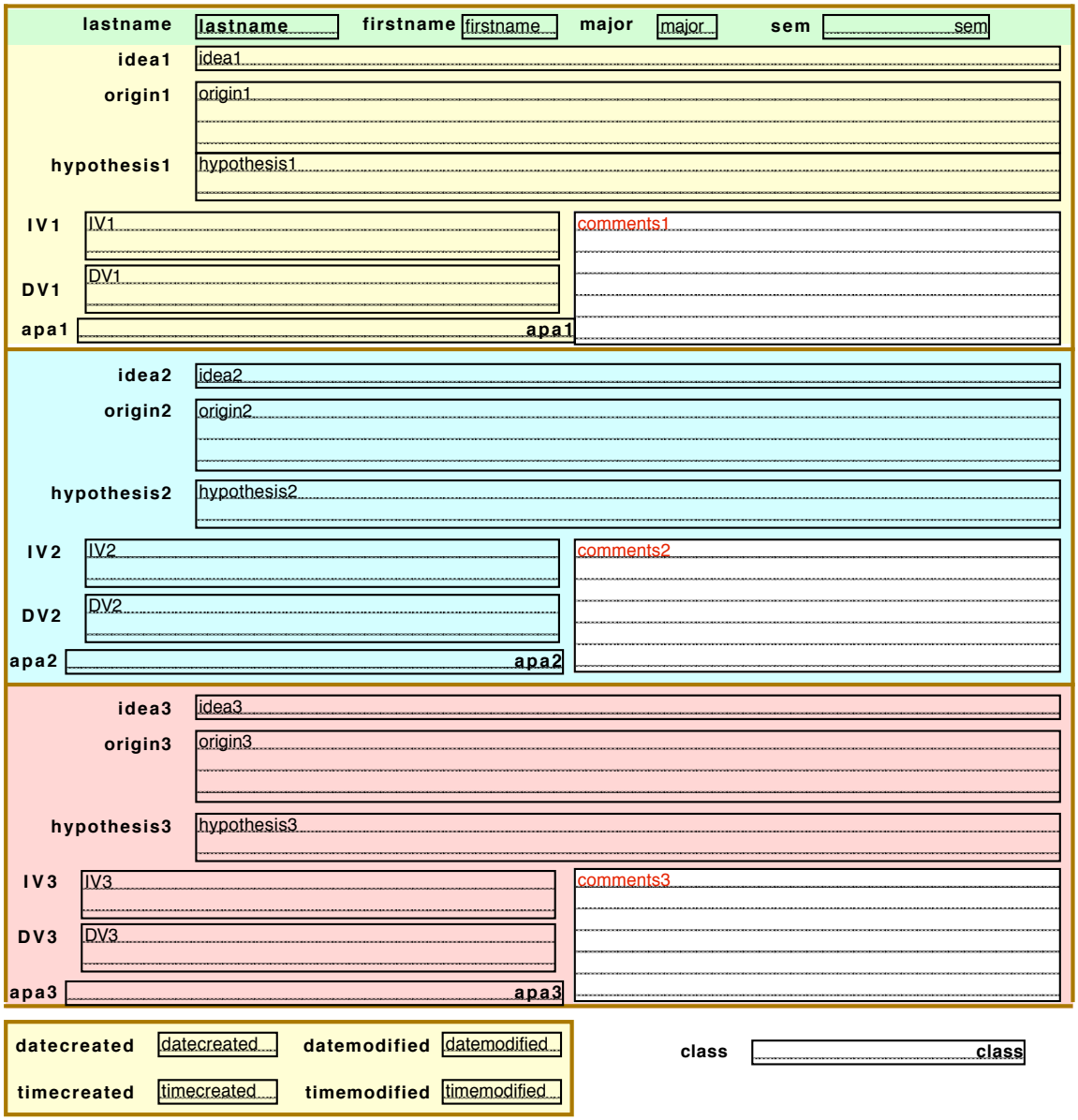


***Figure 1.*** **View of the database showing all of its fields.**

# Senior Thesis/Capstone Approach

**Beth M. Schwartz & Holly E. Tatum**

***Randolph College***

## Where do you find a Senior Thesis/ Capstone Course and How is it defined?

Perlman and McCann (1999) examined how capstone courses are structured within the Psychology undergraduate curriculum using an online catalogue. Not surprisingly, they found the likelihood of requiring a capstone course was dependent on the type of institution. At baccalaureate colleges 82% required a capstone course, compared to 77% at comprehensive institutions and 28% at doctoral institutions. The capstone course required a senior research project at only 5% of the institutions studied. Although we would argue that a culminating research experience provides the most effective way for students to integrate knowledge learned throughout the curriculum and apply their knowledge of the discipline in an engaging learning experience, there are a number of alternative capstone experiences found in undergraduate Psychology programs. The most common alternative senior courses or senior experiences include an issues-oriented course, a history and systems course, a content course such as developmental or cognitive, or an internship or practicum as a senior-year requirement (Ault & Multhaup, 2003).

In a follow-up investigation, Perlman and McCann (2005) focused on undergraduate research experiences to determine what students actually do when they practice psychological research. For questions pertaining to an undergraduate thesis or major project, once again the requirement varied by type of institution. At 4-year institutions, 38% included a senior research requirement, with the requirement included at 34% of master's institutions and 7% of doctoral institutions. Very seldom did the students share their research beyond the classroom setting.

## Randolph College: A Historical Background

Randolph College in Lynchburg, VA was founded as Randolph-Macon Woman's College in 1891, which at the time in the words of its founder and first President William Waugh Smith was, "a college where our young women may obtain an education equal to that given in our best colleges for young men…" Recognized for its academic strengths from its start, R-MWC was the first women's college south of the Potomac to receive a Phi Beta Kappa charter, and the first women's college to be admitted to the Association of Colleges and Preparatory Schools of the Southern States. Randolph College began admitting men in the fall of 2007 and is currently an independent, liberal arts, United Methodist-related college offering 29 major programs, with 75 full time faculty and approximately 725 students from over 40 states and more than 40 countries, allowing for a 9:1 student/faculty ratio.

The college is classified by the Carnegie Foundation as a Baccalaureate College. *U.S. News & World Report's* publication, America's Best Colleges, ranked R-MWC 7th in the nation for international diversity based on percentage of international students and also recognized for the campus ethnic diversity.

The Psychology laboratories at Randolph College began when the College first enrolled students in 1893 by Celestia Suzannah Parrish. Interestingly, she was not very familiar with the field of Psychology, particularly the "new" experimental Psychology at the time. She in turn persuaded Edward Titchener at Cornell to allow her to study the discipline under him and did so in the summer of 1893 (Rowe, 1992). Since the Psychology department's founding, the department maintains a commitment to providing a curriculum that is based in the research process. The current labs, now named in Parrish's honor, were the first Psychology laboratories in the South. Ms. Parrish's tradition of teaching the scientific study of behavior and mental processes is one that is continued in the current academic program of the department.

## Randolph College: The Psychology Curriculum

Today, Randolph College offers a laboratory-based study of Psychology with the principle goal of

the curriculum to provide students with skills and knowledge that will allow them to design, execute, analyze, and interpret an independent research project for the required capstone course. The curriculum is progressive in that it is designed to add research skills to a student's repertoire with repetition and augmentation at each level of education. The department offers study in a broad range of the fields in Psychology, including courses in Abnormal Psychology, Cognition, Learning, Memory, Developmental, Testing and Measurement, the Psychology of Gender, Health, Environmental, Physiological, and Social Psychology. The emphasis within these areas is to prepare the student to critically evaluate evidence about behavior and mental processes. The knowledge and skills acquired in this program enable the student to continue his or her education at the graduate level or to pursue careers in related areas as a liberally educated man or woman. The psychology curriculum incorporates a developmental approach in which students at the introductory level course are provided with the knowledge and skills needed to build on in order to perform original research in the capstone course during a student's senior year. The psychology faculty continues an on-going assessment of the curriculum, with consideration of the APA principals for quality undergraduate Psychology programs (Halonen et al., 2007). During the 1990's the department grew in size from three full-time faculty to its current staff of five.

The Randolph College Psychology curriculum begins with a two-semester Introduction to Psychology sequence. This course sequence provides a thorough introduction to the theory and content of Psychology. Students extend their knowledge of theory and content about at least one area of Psychology when they take a required elective from a selection of 200 level courses that include Child and Adolescent Psychopathology, the Psychology of Gender, as well as Social, Developmental, and Abnormal Psychology courses. Students who major in Psychology are also required to complete a two semester research methods sequence. The first course is focused on applied statistics, whereas the second course is focused on principles of research design and methodology. The research methods course sequence requires students to use at least two information technology tools when they learn to conduct data analyses with SPSS and to conduct searches of the databases that reference the psychological literature.

The APA style research proposal that students develop in this sequence supports the development of their ability to communicate in writing. The research methods sequence is a prerequisite for all 300-level courses and above. Psychology majors further hone their research skills and deepen their knowledge of specific content areas of the discipline when they take one of four laboratory courses: Cognitive Psychology, Learning, Physiological Psychology, or Advanced Social Psychology. Each lab provides students with practice at collecting, analyzing, and presenting of data. These courses support further development of the standards and capacities that were initiated in earlier courses. A History of Psychology course is required of all Psychology majors to provide students with an overview of the questions and theories that have shaped modern Psychology. Students majoring in Psychology also complete a 300-level elective from a selection of courses. This elective allows them to deepen their understanding of a particular area of the discipline and once again focuses on research methodology.

## The Capstone Course at Randolph College

Finally, all students are required to complete the two-semester Senior Seminar in General Psychology as a capstone experience. The Randolph College course is team-taught by three to four members of the department and is focused on the production of a student designed research project with approximately 18 to 22 senior majors each year. This idea of a culminating research experience in which students are responsible for all aspects of the experimental process is not new and was in fact noted as an important component of any undergraduate Psychology program by McKeachie and Milholland (1961). In preparation for our course, during the spring semester faculty meet with junior majors to discuss the details of the upcoming capstone course, to review the current syllabus for the course, and to recommend that students consider and search for possible topics for their group research project during the summer months prior to the course. At times, students form research groups prior to the start of the capstone course, though it is more common that students form these groups during the first week or so of the fall semester.

The fall semester of the capstone course is focused on reviewing research methodology and developing a research proposal. Faculty inform students that the focus of class time will be to provide information and guidance needed to successfully complete the research design and proposal. The semester begins with a take-home exam that requires students to review basic research methods, design, and statistics. During the first day of class, students are asked to discuss their areas of interest, which allows all members of the class to identify who

shares his or her interest. In the week or two that follows, students form research groups or teams and decide on the general topic for their year-long research project.

The group experience provides students with the opportunity to develop the capacity to work collaboratively; however, if G.P.A. requirements are met and the student has interest, he or she can apply to read for honors in the major and in turn can create an individual senior research project. The decision to require group work was based on a number of considerations. The most notable influencing factor was student/faculty ratio. In order to provide the appropriate guidance for all proposed projects, requiring group projects significantly increased the time each faculty member could spend with each group and in turn significantly improved the quality of the research question. A second important factor pertains to the size of the available participant pool. When conducting research at a small institution, one needs to rely on a small number of students to include as potential participants. Decreasing the numbers needed from our participant pool increased the number of participants involved in each project, which in turn, provides an increase in statistical power for most projects. Finally, students benefit from group work experience given the parallel experience most will encounter if they continue their study at the graduate level or in the workplace.

Once groups are formed, faculty research advisors are assigned through discussion among the faculty teaching the course. Assignment of groups to advisor is based on area of expertise among the faculty and based on an equal division of research advising. In the weeks that follow, students are required to conduct a literature search and provide in class presentations of articles related to their research topic. These assignments require students to answer a specific list of questions that includes the following: What is the hypothesis, how does this hypothesis relate to the literature, describe the independent and dependent variables, what is the design of the experiment, do you see any internal or external validity risks, what statistical analysis was used, summarize the results, why are these findings important and how do these findings relate to the literature and to your proposed research. Often, due to the size of the class, smaller discussion groups are formed for these presentations.

Toward the end of the fall semester, students provide an in-class presentation focused on the development of their hypothesis and the details of their methodology. Using PowerPoint, students are expected to clearly communicate the hypothesis of their proposed research, how their prediction fits in the existing literature, briefly describe the major findings in the literature, as well as describe in detail their methodology and choice of statistical analysis. Faculty meet immediately following these presentations and provide feedback to be incorporated in both the Institutional Review Board (IRB) application as well as the APA style research proposal, both of which are, due at the end of the fall semester, and read by two of the faculty members teaching the course. The presentation feedback most often focuses on asking students to more clearly connect their proposed research with the literature findings, as well as clarification about their methodology to ensure that students will in fact be testing the hypothesis as stated.

When the seniors return for the spring semester, they proceed with data collection as soon as they receive approval from the IRB. To encourage students to work on their paper early on in the semester, the first assignment requires students to address the changes needed in the introduction of the paper. Students continue to work in small groups with a faculty advisor to execute a research study. Participants are recruited on campus as well as from other local institutions. When younger participants are needed, local preschool directors often cooperate and inform parents of the opportunities to involve their children.

Class meetings are scheduled throughout the semester to review statistical analyses specific to the projects for that semester, as well as a review of creating tables and graphs. The results of the senior projects are first presented in-class and once again faculty provide feedback to assist students to further improve their presentations for a second required presentation of their research at the spring conference of the Virginia Psychological Association (VPA). Usually, the feedback focuses on changes related to the time limit of 12 minutes, coordination of their slides and the talk, more clearly presenting methodology and statistical analyses, and finally communicating what the findings mean and how these findings relate to the literature. If students incorporate the feedback provided after their in-class presentation, they receive an increase for their presentation grade for the class.

One component of our departmental assessment is obtained from a rating scale used to rate specific elements of our students' presentations, which are judged by faculty from participating institutions. Because of this assessment component, funding is provided for both students and faculty to attend VPA by the Randolph College assessment budget. In addition, students turn in their final paper two weeks before the end of the Spring semester. The final paper is read and graded by the same two faculty members who read it the previous semester. All students are

given the opportunity to revise the paper based on the feedback received, which can increase the paper grade. The department asks all students to hand in a "clean" copy of the paper for the departmental library, which in turn creates a very helpful resource for seniors in future years.

## Assessment and Refinement

To provide the most effective research senior year experience for our students during their senior year, numerous changes have been made over the past 15 years. In the past, due to limited staffing and the importance of covering the topic matter, we also covered the history of Psychology in the capstone course. Not only was this a large academic load for one course, it also detracted from the students' focus on their research. The most significant change was the requirement to conduct group work rather than individual projects, which was primarily due to faculty (research advisor)/student ratio and the participant pool limitations. Because this is often their first experience with a research presentation, we also added the fall semester methods presentations, which significantly improved their spring semester presentations both in class and at the regional conference. Changing the IRB application submission from the spring semester to the fall semester allowed students to begin data collection earlier. Additional changes also include an assignment at the beginning of the spring semester to address changes needed to the introduction section of the paper, as well as class meetings focused on data analysis to be used by students that semester rather than just a general review of SPSS.

## Concluding Thoughts

In recent years, students' research has been recognized with undergraduate research presentation awards at the Virginia Psychological Association Conference, a Psi Chi research award for undergraduate research work, and a Psi Chi undergraduate research grant. The success of the Psychology program is seen best through accomplishments of our graduates. The benefits of undergraduate research experiences, including greater appreciation for the scientific nature of the discipline, increased student engagement, enhanced preparation for and acceptance to graduate school are clearly stated in the literature (Berthold, Hakala, & Goff, 2003; Elmes, 2002; Keith-Spiegel, Tabachnick, & Spiegel, 1994; Mink, 1979).

Alumnae have gone on to earn their Ph.D., Psy.D., M.S.W. and M.A. at universities across the country reporting back that the particular attention to each student's understanding of the scientific process throughout the Psychology curriculum was in large part the key to their success in their graduate work and beyond. Development and execution of these research projects provides our students with an opportunity to apply the skills and capacities that they have been working on in the research methods sequence and laboratory courses.

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# Section 4. Special Types of Research Opportunities

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# Research at a Local Zoo

**Joanne D. Altman**

***Washburn University***

Conducting research at a zoo is both a fantastic opportunity and a singular challenge. After all, you have a large, diverse collection of animals available, for which you are not responsible. You can conduct animal research without the difficulties and expense of an animal laboratory and laboratory staff. But you also lose the neat, precise controls of laboratory research, and all control over the animals. As a researcher you must be patient, persevering, flexible, and creative. But when you forge a good relationship with your local zoo, you have a wealth of opportunity for nurturing the undergraduate research experience in psychology.

## Types of Behavioral Research

The zoo offers arenas for research on a wide range of species, including humans. There is a niche for visitor studies at the zoo. (For a review see Davey, 2006.) The zoo is a common site for a family outing and offers an ideal opportunity to investigate family relationships, sex role stereotypes, and social roles, through observational methods. Burns, Mitchell, and Obradovich (1989) observed mothers and fathers carrying toddlers and found fathers were more likely to carry daughters than sons while mothers did not discriminate among their children. Women were also more likely to be in charge of the strollers and bags carrying children's supplies than men. A study of children in a children's zoo also highlighted gender differences in kids and found that little girls were more likely to approach animals than the boys (Morgan, unpublished data).

Students can also look at the interaction between visitors and animals. Students can investigate how visitor density affects the behavior of the animals. Sellinger and Ha (2005) found visitor density and intensity increased unfavorable behaviors in zoo animals (pacing and reduced visibility) and Wells (2005) reported greater agitation among gorillas with higher visitor volume. However, one study we conducted found that gorillas actually sought the attention of visitors. Gorillas spent more time near viewing areas when people were present compared to when they were not present (Altman & Snyder, unpublished data). Thus, the dynamics of the exhibit and how animals respond to visitors is a viable avenue of research.

Likewise, how the visitor responds to the behavior of the animals is also a viable area of research. One of the major goals of a zoo is education (Conway, 1969; Hediger, 1950) with the hope that education leads to better attitudes toward conservation. Thus, the message visitors leave the zoo with is important to zoos and the future of endangered species. In a study which eavesdropped on conversations at the exhibits of three different species of bears, research found that visitors spoke about behaviors only when animals were present and active compared to when they were sleeping or pacing. Otherwise, conversations at the exhibits focused on anything but animal behavior (Altman, 1998).

Of course, the most popular research conducted at the zoo is that which focuses on non-humans; and there are a variety of approaches students can take when pursuing animal research at a zoo. One approach is to view the zoo collection as an auxiliary animal laboratory and find animal models for theoretical research. Thus, a student has a research project in mind and approaches the zoo for use of individuals in its collection as research subjects. For example, students interested in the animal cognition literature on numerical competencies in primates (Beran, 2001; Boysen, Berntson, & Mukobi, 1999) might be interested in determining whether this ability only shows up with extensive training in a laboratory context, or if animals demonstrate ordinal judgments in other environments. Cantlon and Brannon (2007) found that monkeys, even those untrained in numerical reasoning, do use numerical attributes for information even when other information is available. However, they still tested animals using a laboratory task-oriented format rather than naturalistic patterns of behavior. Therefore, the young researcher might try implementing a numerical reasoning task in a naturalistic zoo habitat, eliminating the constraints or demand characteristics of a laboratory setting. The limitation of using zoo animals for theoretical research is that one is not necessarily testing the best animal model for the question he is asking, but rather the most available animal model from among the collection one has access to.

The most common type of animal research

conducted at the zoo, which benefits both the researcher and the zoo, is enrichment studies. Enrichment studies focus on ways to improve the physical and psychological well-being of the captive animal. Enrichment focuses on changes to the style or structure of the habitat, objects in the habitat to interact with, or food manipulation. Burrell and Altman (2006) looked at changes in behaviors of cotton-top tamarins as they were switched across three different types of exhibits. Unsurprisingly, the tamarins were most active, even when least visible, when free ranging in a rain forest exhibit compared to two different caged environments. How active the tamarins are and their range of active behaviors in captivity have implications for reintroduction efforts to native habitats. The first author on this research was an undergraduate student when these data were collected.

Researchers, of course, have no control over creating exhibit changes, but plans for an exhibit change creates the perfect opportunity for student research. New habitats under construction, and animals being moved due to seasonal changes, are opportunities for comparisons across habitat types. Zoos are always developing and working towards improving their animal exhibits so opportunities often arise, even if exhibits are not new. In addition, individual animals living in social groups are often moved out of a group or are introduced to a new group, and such occasions also offer research opportunities. Of course, one needs to know about these changes with enough time to get baseline measures of behavior before changes are implemented. This suggests nurturing an on-going relationship with the zoo.

While the researcher has no control over the events of construction of new exhibits or the relocation or introduction of animals, activities such as adding toys and other enrichment devices are much more flexible for the researcher to study. These objects can be introduced at any time and are perceived to engage the animals and encourage a wide array of species-typical behaviors, while at the same time reducing the behaviors deemed indicative of psychological stress or distress. Altman (1999) used manipulatable objects with sloth, spectacled, and polar bears to reduce pacing and excessive inactivity. Large plastic floats reduced these behaviors in the polar bears and plastic balls halved pacing in the spectacled bear, but not the sloth bear. Thus, there are not universal answers for enrichment and enrichment projects at zoos should not be applied without being assessed. This opens a wealth of opportunity for students.

The most common form of enrichment is perhaps food enrichment. Food is a great motivator and the old, classic studies (Carder & Beckowitz, 1970; Neuringer, 1969) suggest that animals do prefer to work for food. In addition, a great portion of an animal's wild behavior is usually centered on food. Therefore, introducing food enrichment often encourages naturalistic patterns of behavior. In a study at the Topeka Zoo in Kansas, Altman, Gross, and Lowry (2005) switched lions from a conventional six day a week feeding schedule to a random "gorge and fast" feeding schedule that better models naturalistic patterns. Lions were slowly reduced to eating only 3 days a week but were fed the same amount of food per week. The lions showed increases in appetitive (goal oriented) behaviors while pacing halved. The lions also showed an increase in digestibility and a corresponding decrease in food intake and metabolized energy intake. Thus, changing the feeding pattern of the lions improved nutritional status and increased species-typical behaviors. Changes in feeding schedules of the lions, along with the daily fecal collection necessary to measure digestibility, involved fairly invasive and complex activity that required a good deal of effort and cooperation from the zoo. Other types of food enrichment do not necessarily involve as much effort on the part of the researcher. There are food logs where food is inserted into objects with limited access; peanut butter can be smeared across logs and rocks around the exhibit; orangutans are given long sticks to "fish" for sauces, like mustard, on a plank outside the exhibit. Students can assess the attention animals give to these activities and the animals' subsequent behaviors.

Another avenue for behavioral research at the zoo that requires no invasive techniques (like feeding regimes or fecal collection) and no cooperation of the keeper staff (implementing enrichment programs) is the study of the usage of exhibit space by individual members of an enclosure. Many physical and social factors contribute to how well an exhibit is used and it is a significant topic of study in the literature. Mallapur, Waran, and Sinha (2005) tied usage of space to the type of behaviors displayed. Renner and Lussier (2002) found limited use of cage space in two spectacled bears as an index, in part, of a limited behavioral repertoire, which they subsequently improved with a climbing apparatus. Hence, how well animals are using their enclosure may be an index of well-being and may point to opportunities for enrichment. The questions one asks can be experimentally and statistically tested by breaking an exhibit up into quadrants and comparing the amount of time spent in each quadrant or by investigating use of quadrants as a function of sex, age or status, or visitor presence.

This last avenue of research, evaluating use of captive habitats, is the easiest way to get started in zoo research. A trip to the zoo will familiarize the new zoo researcher with the types of animals and exhibits available, and the researcher can start generating questions about how the animals use their space, spend

their time, or interact together. Spending a lot of time observing a specific exhibit will increase the likelihood of meeting zoo keepers and obtaining additional information on the animals. The student should work to develop a rapport with zoo keepers; this relationship can lead to cooperative efforts with the zoo which can lead to greater access to the collection and the generation of other hypotheses.

## Forging Relationships with a Zoo

None of this research at a zoo is possible without establishing a relationship with zoo staff. Even when doing strictly observational research, a researcher needs background information on the animals in the collection. For research that involves any manipulation of the environment, one needs the cooperation and good will of the keeper staff. The greatest source of information and day to day activity will come from keeper staff. However, for permission to conduct the research, one needs to approach the head administration of the zoo, usually a zoo Director. Thus, the zoo researcher must know the proper power structure of the zoo and respect it. The Director makes the decisions so his approval is required first. The budding zoo researcher should also be careful to communicate about the project with everyone. If the Director agrees but the keepers feel put upon, the researcher will have quite a struggle. If the zoo veterinarian plays a strong role in decisions made at the zoo than a researcher wants to be sure he has had a conversation with the veterinarian. The reason for this is that all the levels of the hierarchy do not communicate with each other and zoos often have their own internal power struggles. A zoo researcher needs to have buy-in from, and the good will of, all the important players without getting involved the local politics.

Establishing contact with a zoo sometimes takes more salesmanship than one might expect. While the relationship between a zoo and a university can be very mutually fruitful, it is often tenuous and the academic is met with suspicion. Part of the problem is that the zoo and the researcher have different priorities. The zoo's priority is husbandry and management while the researcher's priority is, of course, research and methodology. So, for the researcher it is imperative that the zoo not change anything until the experimental condition is over, while the zoo takes offense at being dictated to when it has more than just one animal to consider. There may also be some negative perception of outsiders coming in acting as experts to keeper staff who truly are experts with the animals they manage. Finally, the cost-benefit ratio of the relationship between the zoo and the university is not the same for both parties. The researcher has little to lose. However, the zoo has the risk that the researcher might find or report information that may create negative publicity for the zoo. It makes them cautious.

Thus, a researcher must always nurture her relationship with a zoo. She must educate herself on the political hierarchy and pay homage to the right people. But she must never forget that she will not succeed without the help of the keeper staff who work with the animals on a daily basis. A researcher and her students must show keeper staff and their knowledge of their animals respect, and recognize research is not a zoo keeper's top priority. Furthermore, the research must be valuable to the zoo. Therefore, researchers must follow through and share the results with the zoo. The best way to keep the relationship going is to make the relationship reciprocal. University research should feed back to the zoo and be helpful in its management choices. University researchers can also make their relationship valuable to the zoo by trading resources. The one thing professors are rich in is access to students. Students are often very interested in volunteering at the zoo and zoos have critical times when they need extra help observing a newborn to be sure there are no complications, or to observe a new exhibit for unexpected escapes. The more reciprocal the relationship is, the stronger it will be. Navigating the human social politics should be given as much attention as one's research protocols.

## Pitfalls

Zoo research is only for the passionate student researcher because it takes longer and is harder to do than traditional laboratory or survey research. It requires long hours of observations across months and balanced across times of day and days of the week; which is fairly difficult for the student to manage. In the gorge and fast lion study (Altman et al., 2005), students observed lions 7 hours a day for 10 weeks. Burrell (Burrell & Altman, 2006) observed tamarins across exhibits several times a week in 10 min. intervals for 7 months. That means running back and forth to the zoo when the pre-established random schedule dictates, rather than by a schedule of convenience. Certainly a student chooses an easier path when he hands out a survey or runs subjects, or participants, at his convenience.

In addition, student researchers have no control over the animals they study or the conditions under which they are managed. The study of the tamarins across exhibits actually started out as a study of an unusual family structure of tamarins in the zoo's rainforest and an investigation of how the family utilized its space in the exhibit. Tamarins are pair-bonding monkeys and live in family groups of the mating pair and their newborn twins and twin yearlings. This group consisted of older siblings and no father and

the student was looking at the relationship among the offspring and the mother in the absence of the father. The mother died. So the project evolved to the relationship among the siblings in the rainforest without the parents. Then one day the tamarins disappeared from the rainforest. They had been moved to an open air cage outside of the rainforest. Thus, the project became a comparison between a caged vs. free ranging exhibit. As the weather cooled, the tamarins were moved again to a cage that had both indoor and outdoor access. The project was expanded to compare behavior across the three types of exhibits. It turned out to be a great project, but it was a result of being flexible rather than being brilliant.

There are limits to one's flexibility, however; and though things worked out for this next student, it may not always. One student had her heart set on documenting changes in two elephants as a function of enlarging their exhibit and switching them from being chained to free ranging in the exhibit. The construction of the exhibit took a year longer than projected. However, the student stayed with the project and continued to do observations during the intervening time and managed to complete her project and present her results at a regional student conference. She was fortunate that she started her research early in her college career, for it is the only reason her research did not take longer than her degree!

One final constraint of zoo research is a methodological one. Working with zoo animals almost always means working with small n's. In captivity there is a very finite subject pool. This leads to two choices. One option is to report single subject design data and descriptive statistics. The drawback is that most journals want to see inferential statistics. A second approach is to treat observations, and not animals, as statistically independent samples and thus use a mean proportion per observation in the analysis of variance which results in much larger sample sizes. While, using observations of a single animal as the sample size is not traditional, it is neither uncommon nor unacceptable. When working with single animals in captive zoo environments it is often unavoidable. Several notable papers in the early literature employ statistical tests on individual animals that assume observations as independent. Carlstead et al. (1991), Wechsler (1991; 1992), Markowitz et al. (1995), and Altman (1999) used Mann Whitney U and/or Kruskal-Wallis tests. Both of these tests assume independent samples (Siegel, 1985). Statisticians understand this. However, the method can be rejected by those who only tout conventional techniques.

Placing the pitfalls at the end of this chapter may make conducting zoo research sound daunting. However, perhaps the hardest part of conducting zoo research for students is staying on task when they are engaged by the animal. It is often hot, smelly, and loud from kids yelling, and yet student researchers love collecting data. They feel a connection with the subjects that one just does not get with introductory psychology students. Like keepers, they start to learn the nuances of the behavior of their subjects. The zoo is an opportunity to conduct behavioral, social, and cognitive research with animals in an academic environment often no longer supportive of the animal laboratory. Faculty members do not have to scrounge for grant money to keep laboratories open or compete with colleagues for their piece of a shrinking pie. The local zoo offers faculty an arena for guiding the student researcher through theoretical and applied research opportunities in a way that may be enriching for the zoo and transforming for the student.

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# Engaging Students in Community-Based Research

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A key feature of a good undergraduate psychology education is the opportunity to conduct an original research project. In fact, the number of undergraduate programs including research-based courses in their curriculum has grown in recent years (Perlman & McCann, 2005). However, it seems that students do not always see how the process of scientific inquiry in psychology is relevant to their lives. Furthermore, despite the fact that many teachers of psychology would like to believe that their students will go onto graduate school and continue to conduct scientific investigations of psychological phenomena, this does not always happen. Thus, it is important to make involvement in research meaningful for both students who are interested in theoretical investigations of psychological phenomena as well as for students who are not sold on the value of research. One type of research approach that can be appealing to both the inherently interested students as well as the skeptical students is research that is based within the broader community.

Community-based research provides a direct benefit for the members of the broader community while it also provides students with the opportunity to conduct scientifically sound research that has practical applications (Mettetal & Bryant 1996). Community-based research studies typically involve a systematic investigation of some phenomenon in the community (e.g., the prevalence of domestic violence in a community, Chapdelaine and Chapman, 1999; or an examination of educational practices in a school, Khanna, Scott, & Cortese, 2006). This scientific investigation of a community phenomenon allows the skeptical student to see how research has "real world" applications at the same time that it fulfills the more interested student's desire to conduct theoretically-grounded research. Furthermore, for all students, community-based research brings the theories and phenomena that are covered in many content classes into a practical and tangible setting. Moreover, allowing students to participate in community-based research will provide them the opportunity to see that research can have immediate, direct, and long-term benefits.

## Deciding If Community-Based Research Is Right for Your Students

There are several points to consider before embarking on a community-based research project with your students. As with all types of research projects there are benefits and drawbacks for a particular method of inquiry. The benefits for the students are relatively clear. They will have the opportunity to conduct an investigation that is grounded in theory, but that has practical applications. Thus, they will garner all the benefits of conducting original research at the same time that they see the immediate relevance of the research. One key point, that some may consider a drawback to community-based research, is that it is important to design a community-based project that will have a direct benefit for the community, either at the level of benefiting the individuals who are involved as participants or at the level of the larger community (e.g., aiding in the collection of important community information about domestic violence, Chapdelaine & Chapman, 1999; gaining information about the appropriate reading strategy to teach children, Khanna et al., 2006).

Therefore one of the first questions that a researcher must ask him/herself is if there is a community benefit for this research. If at all possible, it is best to ensure that the participants themselves will receive a benefit for their involvement. Furthermore, this benefit should not necessarily come in the form of monetary compensation (although it may), but instead be some other type of benefit. For example, student researchers and I have conducted examinations of the types of reading programs that are currently used in local schools while investigating the prevalence of different reading-aloud strategies used by children (e.g., a sounding-out strategy vs. a rhyming analogy). In conducting these studies we included a period of time in which one or more of the investigators read with the children. With this activity included, the participating young readers received the benefit of reading with an expert reader, while we (the experimenters) investigated the relationship between reading instruction type and reading-aloud behavior. In conducting this community-based

project it was important to keep in mind that the community was a contributing member of the research team; they deserved to benefit from the project just as much as the student investigators and I did.

Before conducting a community based project with students, you should also question yourself about whether or not the students are ready to conduct this type of research. That is, you should ensure that your students are ready to work with members of the target community in a professional manner. If, for example, students will be working with young children in the community, make sure that they are appropriately trained (e.g., they have had supervised experiences working with children). Also, keep in mind that many community groups (e.g., schools, non-profit groups, etc) require a thorough background check be conducted before anyone can begin interacting with their community members. This may restrict some students from engaging in a specific community-based research project (believe it or not, some students may not clear that background check).

Even if students pass a background check and have had adequate experience working within a community similar to the target community, this does not mean they are necessarily ready to be involved in community-based research. This is an important point to keep in mind. Although instructors know that certain students are more professional than others, the members of the community might not. Thus, before students interact with community members in a research project, it is important to ensure that the students know how to conduct themselves in a professional manner. This professionalism ranges from knowing how to dress in an appropriate manner to knowing how to maintain the confidentiality of participating community members.

## Selecting a Community-Based Project

Sometimes the most daunting task in conducting research simply is selecting a question to explore and designing a research program that will accurately tackle this question. This same difficulty is found in selecting and designing a community-based research project. As stated above, you must ensure that the project will benefit the target community while still addressing the theoretical question at hand (Mettetal & Bryant, 1996). Sometimes the best way to achieve this is to solicit the help of your community members. For example, when my students and I embarked on the task of examining the efficacy of certain reading programs within local schools, we went directly to the members of the target school communities to ask them what kind of questions they have about their reading programs. From these questions, we were able to shape a scientific investigation to address a subset of these questions. Through their inclusion in the design process, the community members seemed to feel more invested in the project and more interested in the subsequent results. Keeping this in mind, it is also important to design a research project that is feasible for students to complete, while still addressing issues of concern to the community. This is often constrained by the type of class for which the students are completing the project.

Undergraduate students engage in research projects via several different venues including research methods courses, independent studies, advanced content lab courses, and as honors or capstone projects (Perlman & McCann, 2005). Thus, it is important to design (or guide the design of) the project in a way that is feasible given the constraints of the course in which the students are conducting this community-based research. Often, students will be completing a research project as part of a one-semester course. If this is the case, it may be desirable to design a community-based project that can be completed in a relatively short amount of time. However, if this will severely infringe on the research questions of interest, you may want to consider designing a more extensive project and asking the students to continue their engagement in the research beyond the course or to hand the reins over to a new class of students in the subsequent semester(s). Of course, switching experimenters in the middle of a research project is something that should be done after careful consideration of the consequences on both the validity of the research project and the well-being of the community participants. In addition, the student researchers may leave the course without the benefit of seeing or producing the final product of the research product. The absence of a final product substantially cuts into the value of the research experience for the student experimenter (Kulik, 1973).

Another factor that should be considered during the design of the community-based project is the number of students that can act as experimenters and the amount of time that each student should be expected to dedicate to the research project. This, again, is often dictated by the type of class in which the students are enrolled. In a class with many students (e.g., 25 or more) it can be hard to design a project that requires that much manpower. On the other hand, in an independent study course, there may be only one or two students contributing to the project. Instructors should strive to achieve a fine balance in the design of the community-based project such that all of the students are equally engaged in

the project, while at the same time ensuring that the scope of the project is not overwhelming for a relatively small group of students.

Finally, when selecting and designing a community-based project it is also important to keep in mind the best interest of the student experimenters. For instance, students should not be put into situations in which they are very vulnerable to confidentiality breeches to themselves or to the community participants. In addition, it may not be appropriate for students to interact with certain members of the community (e.g., incarcerated individuals). Furthermore, a project that may seem very reasonable to the instructor and to most individuals in the course may not be appropriate for all members of a class. For example, the project conducted by Chapdelaine and Chapman (1999; in which students collected information from community members about the prevalence of domestic violence within the community) may not be appropriate for all student researchers. A student who has been the victim of domestic violence or who has a family-member or friend who has experienced domestic violence may feel very uncomfortable contributing to this type of project. Thus, it is essential that appropriate measures are taken to ensure that all students are comfortable with the project material. If a student is not comfortable with the engaging in the community-based project, an alternative assignment or experimental duty (e.g., a duty that does not involve the interaction with domestic violence victims) should be given to the student.

## Obtaining Permission to Work with Community Groups

Once the community-based project has been selected and designed, the research group must seek out approval to conduct this project. This approval must come not only from the university Institutional Review Board (IRB), but also from the community of interest. There is some ambiguity about whether or not research projects conducted within a course should be evaluated by an IRB before data collection begins. This ambiguity likely arises because, according to the Office for the Protection from Research Risks within the National Institutes of Health, only institutions which have federal research funds are required legally to evaluate research with human subjects via an IRB (Office for Protection from Research Risks, 1983/1989). Research conducted within an undergraduate course may not occur at an institution that has federally funded research (e.g., at small private colleges, Kalgreen & Tauber, 1996). In contrast, according to the U.S. Department of Health and Human Services, "…all research involving human subjects…" should be evaluated by an IRB regardless of whether or not it is conducted at an institution receiving federal grants (HHS Policy for the Protection of Human Research Subjects, 1991, sec. 46.101). Thus, it is my strong recommendation that any research project conducted with undergraduate student collaborators be evaluated and approved by a university IRB before any data is collected. Of course, the level of IRB review (e.g., exempt, expedited, full-board) will be determined by the mechanisms set-up by the individual universities. If you are new to the university IRB process, I recommend that you seek out the director of your IRB and consult with him/her about the community based project that you are planning for your students. He or she will be able to tell you what type of protocol and application to submit (e.g., exempt, expedited, or full-board). In addition, the IRB director will be able to tell you what type of community approval, if any, they will request of you before you are to commence your community based project. Whether or not you are required to submit community approval to the university IRB will largely depend on the community group of interest. If the community is composed of minors or other potentially vulnerable participants (e.g., prisoners), the university IRB will likely want approval from the community before granting their own approval.

Seeking out approval to conduct research within a targeted community presents unique challenges. This is largely because community groups vary greatly in the type of research review processes that they employ. These review processes can range from no oversight from a community-based review board to a full-scale review conducted by a community-based IRB. When the community of interest is not defined by any administrative group, but is instead characterized by common interests or characteristics (e.g., adult women with children in a specified metropolitan who are recruited for participation in a public setting), then the research group may simply get approval from each individual to consent to his/her own participation. On the other extreme, many community groups have a formal administrative body organized around the task of reviewing research projects. This is often the case with middle to large-sized school districts or other government institutions (e.g., departments of correction). When this is the case, the research group will likely need to submit a formal research proposal including the project protocol, participant consent forms for adult participants, parental permission forms, and/or minor participant assent forms among

other things. It is important to prepare these materials in a way that will be meaningful to the community members reviewing them. Thus, it is best to use lay terminology and to keep descriptions of protocol and procedure brief, but accurate. Unfortunately, the review process among community review boards often takes more time than in the university IRB. For example, several school districts with whom student collaborators and I have worked have requested that we submit our research materials for their IRB to review at least one full semester before the desired start date. Thus, conducting a community-based research project often requires substantial and early planning.

I should also note that community-based research review boards can be skeptical of research and may not allow many, if any, researchers from outside of their community to conduct research with their community members. This can especially be the case with school districts and other government agencies. Furthermore, many community groups are bombarded with research requests and simply cannot accommodate all of them. Thus, it is imperative for researchers to plan ahead and to be aware that working with community groups is a privilege that they may not be granted. However, there are things the research group can do to increase their chances of their research program being approved by the community. As I stated before, a community-based research project should be designed such that it will directly benefit participants. From my experience, projects that include benefits for participants are more likely to be approved by the community research review board. These benefits could be monetary compensation; however, some community groups (e.g., school districts) will not want their community members to receive money or gifts in exchange for their participation. Instead, many community groups would prefer that participants are compensated with some sort of service or an educational benefit. For example, in the reading projects that my students and I conduct, participants experience the direct benefit of learning new strategies for reading.

Another way to increase the likelihood that a research project will receive community approval is to consult with members of the target community (e.g., teachers) about the type of research projects in which they may be interested. In doing this, you are designing a study that is not only of scientific interest to you and your students, but one that is of interest to the community. In addition, in brainstorming research ideas with members of the community, you will development relationships and alliances with community members who may have the opportunity to be your advocates during the research review process. However, your goal should be for the research proposal to sell itself by clearly describing how the community will benefit from the completion of this project.

## Data Collection and Interacting with the Community

When the time comes to commence with the project, there are several ways in which a community-based project will differ from a typical student-run research project. First, most community members will not be experienced research participants, unlike many undergraduate students. This inexperience makes the consent/assent process all the more important. The student experimenters must be very careful and thorough in explaining the procedures of the study, the time commitment expected from the participants, and that community members can end their participation at anytime. Most of all, experimenters should pay close attention to ensure that participants understand that they will be participating in a research project. This may mean that the experimenters ethically are not permitted to talk with the participant about his/her responses/results. From our projects on reading education, my students and I know that it is very difficult for many parents, teachers, and principals to understand that we cannot share the responses that individual children make during our studies. Thus, we found that it is so important to stress to the participants and their parents the nature of the study and the type of results that we will be able to communicate to them at the completion of the study. For example, my student experimenters and I tell the parents that although we will be measuring their child's reading ability, we will not be able to share their child's specific scores. However, we also indicate that we will be able to share information about the reading ability of the study participants, as a whole. Thoroughly explaining these aspects of the research project may mean that some community members will not participate. Nonetheless, this is much better than misleading the participants (or their parents) about what the study is designed to do and the type of results you will be able to communicate to them.

In designing consent and assent documents it is also very important to keep in mind the audience. Thus, a good rule of thumb is to design consent documents that are at a 4$^{th}$ grade reading level, or in very plain language. This is not to say that it should be assumed that the target community is not well-educated. However, it is almost certain that the community-members will not be familiar with an

idiosyncratic area of psychological research. Using simple language will make it much more likely for the community member to understand the document that he/she is reviewing. Furthermore, it is important to include a consent document that is written in the home language of the community members. I have found that it is most effective to distribute consent/assent written in the home language of the participants and as well as ones written in English. Again, the most important point is that you want all of your participants to understand the nature of the research in which they are asked to engage. To this end, it also may be useful to make a verbal presentation about your project to your target community members before they consent to participating. It often is quite comforting for a community member to see the face of the person who is asking them to participate in the research project. Because of this, it is useful to have the student experimenters present and engaging the community members during these verbal presentations.

During the data collection phase of a community-based project it is also important to stress to student experimenters that they must always treat community participants with dignity and protect their confidentiality. This is especially the case when the student experimenters are also part of the community from which the participants are drawn (e.g., both the experimenters and participants reside in the same town). If the data to be collected is of a highly sensitive nature, the instructor may want to include only communities that are distinct (e.g., located in a different town) from the student experimenters' community. Whatever the target community may be, it is always imperative that the student experimenters know that it is inappropriate to talk about the participants with whom they are working, outside of the experiment setting. Furthermore, it often is unethical for the student experimenters to interact with community participants outside of the experiment setting.

## Communicating the Results of a Community-Based Project

As with any research project, it is essential to disseminate the results of your community-based research project. The traditional scientific venues (e.g., peer-reviewed journals, national, regional, or student conferences) are appropriate. However, the results should also be disseminated to members of the community. Sharing the results with the community shows the respect and appreciation that you have for their participation. In addition, for many community members, this will be the only research in which they have ever participated; they will want to know the results. I have found that this is especially the case for parents of young participants. Thus, it is important to keep in mind the type of results that you present to them (e.g., you will be able to tell them how the participants did, as a whole, but you likely will not be able to tell them how each child performed).

There are several different ways to present results to community members; they can be presented as a written report, a verbal presentation, or as some combination of both. I prefer making a verbal presentation to community members. This is because a verbal presentation will allow me or the student experimenters to answer questions that community members have or to expand on any points that are unclear. However, I have also found that a written report can be useful and appreciated by community members. No matter the mode of presenting the results, there are a few points to keep in mind. First, make sure that the results presented are meaningful to the audience. Your students may have conducted a study that helps differentiate two theoretical models of behavior. But, will this theoretical distinction seem important to the community members? It likely will not, but hearing about the general findings of your students' experiment may be really interesting. For example, I have found that parents, teachers, and principals do not want to know how the reading strategies that their children use helps to identify the appropriate theoretical model of word recognition (e.g., the Parallel-Distributed-Processing Model; Plaut, McClelland, Seidenberg, & Patterson, 1996). On the other hand, they do want to know that their children are more likely to use a phonics-based strategy than a word-rhyming strategy when pronouncing new words. While it is very important to describe your results in a way that is digestible and interesting to your audience of community-members, it is still important that it is not overly simplified. In line with this, it is important to make your professional contact information or that of your students, available to community members in the event that they have additional questions about the study or the results.

Finally, the process of disseminating the results of the study to community members should be viewed as an opportunity to highlight the abilities of the student experimenters. Thus, if possible, have the students present the findings to the community members. You want your community to know that your university/college is a substantial community asset and that your students are not only learning how to conduct sound research, but are able to present articulately the results of their work.

## Is it Worth All of the Extra Work?

Conducting a community-based research project with your student experimenters requires, undoubtedly, a substantial time commitment. There are many extra steps involved in the processes of preparing the study, conducting the study, and disseminating the results as compared to a lab-based project. However, the benefits are numerous. Students feel more invested in the project, the community benefits, you have the opportunity to show your community what your university's students can do, and students can see the fruits of their labor, first hand. Thus, higher costs of time and effort involved in a community-based research project are far outweighed by the benefits.

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# Using Field Research Techniques to Enhance the Undergraduate Experience

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It is almost universally true that undergraduate faculty (and perhaps to a lesser extent, undergraduate students) recognize the value of getting students involved in the research process. Students learn the steps necessary to produce original knowledge, and then go on to create their own unique contribution, which gives them an appreciation of the effort necessary to the process. However, too often the students focus on the power of the experimental method, to the exclusion of other methodologies. It is my purpose in this paper to describe my laboratory course in Biopsychology (Animal Behavior), with the goal of reminding the reader of the availability and appropriateness of nonexperimental techniques. I will also list some resources that I have found appropriate for my class, and describe their merits.

My upper-level course in Biopsychology is somewhat of a hybrid course. I take a standard Animal Behavior or Comparative Psychology course, and add to it a healthy dose of neuroanatomy, physiology, and cell biology. This course typically enrolls 20 students every spring semester. The optional laboratory sections enroll 8-15 students. It is these laboratories that are the focus of this paper. It is in these lab sections where students learn to use the nonexperimental techniques that are a bastion of this type of research.

I teach this course in the spring to take advantage of the spring migration of the Sandhill cranes (*Grus canadensis*) through the Platte river valley in central Nebraska. Every year, approximately 500,000 Sandhill cranes spend about 2 months, from approximately February 15 to April 15, engaged in feeding and courtship in central Nebraska (Tacha, Nesbitt, & Vohs, 1994). This annual event provides a golden opportunity for my students. Not only do they get to observe one of the great migration events on the planet, but it gives the students a chance to follow in the shoes of such researchers as Karl Lorenz and Niko Tinbergen, gaining an appreciation for the power of focused observations in the natural environment.

## The Course: Overview

My course is a standard semester-long course that meets once week for 75 minutes. The requirements for the semester include two empirical research papers. The first project is a naturalistic observation project on Sandhill cranes, which the students do as a group and write up individually. This project allows them to try out the various techniques they have learned earlier in the semester, and evaluate the appropriateness of the different techniques in different situations. The second project is a student-initiated project completed in small groups (2-3 students). This project, on a topic of the students' choosing, allows them to put the skills they have learned earlier in the semester to use.

## The Course: Details

The course starts with a description by me of the purpose of learning about nonexperimental techniques. I emphasize that non-experimental techniques are not only appropriate for nonhumans, but for humans as well. I mention studies of aggression in fighting fish, (*Beta splendens)* and studies of aggression in daycare centers; studies of courtship and mate selection in guppies (*Poecilia reticulata*), and flirting behavior in humans. My purpose for this is two-fold. First, I am trying to ingrain the habit of thinking about humans in relation to the rest of the animal kingdom. Human behavior is novel in some ways, but in many other ways it echoes the behaviors we see in nonhumans. Second, and perhaps more important, I am inculcating in them the idea that there are some research questions that are not amenable to the experimental method. I do, however, talk about the limitations of non-experimental research at this time.

During the first lecture I assign Altmann's (1974) seminal paper on observational studies. This 40-page paper is broken up into nine chapters, and I assign the first two chapters. These two chapters explore the purposes behind observational research and deal with definitions of necessary concepts such

as the difference between *states* and *events*. The following week I lead a discussion of the first two chapters, and assign groups of students to present the following six chapters, on the various techniques.

In that second week, the students lead the discussions of various techniques such as focal animal sampling, sampling all occurrence of some behaviors, and instantaneous sampling. The students were instructed to focus their presentations on the purpose, the uses, the strengths, and the weaknesses of each technique. The students are a bit unsure about the material, so after making sure from their discussion that they have indeed done the reading, I do not allow them to flounder too badly before helping them to make sure they hit the main points as outlined above. I would not say that the students enjoy making the presentations, but I do believe that this procedure helps them learn and understand the material better than simply listening to me present it.

The following week, I introduce the students to ethology by using prepared videotapes of kittiwake behavior (Dickins & Clark, 1993). This exercise guides the student in developing an "eye" for behaviors that are unlike any that they have probably encountered before. The exercise guides them through the process of developing rudimentary behavioral categories, and, using focal animal sampling, teaches them to apply those categories in a naturalistic setting (via videotape). The exercise guides them through the nuts and bolts of behavioral categories, and helps the students understand the requirements for constructing good behavioral categories.

In the next two weeks, the students engage in some "live fire" exercises such as those contained in Brooks and Yasukawa (n.d.) and Ploger and Yasukawa (2002). These exercises have the advantage of using live animals, with all the unpredictability that entails. We have an animal colony, so we use the exercise from Brooks and Yasukawa, which involves a mouse ethogram (description of the repertoire of behaviors of an organism). Because of the nature of mouse behavior in a cage, the ethograms are relatively straightforward. The students get the experience observing live organisms, developing behavioral categories, and applying those categories to the organism. The students are surprised at the difficulty of developing these categories, given the dual goals of making the categories simple yet precise. It is also necessary that the ethogram be usable by other students in the class.

While the students are completing these ethograms, they are also reading papers on Sandhill cranes (e.g., Tacha, 1988; Tacha, et al. 1994). These and other related papers describe the Sandhill crane migration through the Platte river valley in central Nebraska. The students are aware that they are going to be collecting data on the cranes as they migrate through the area on their annual trek north. The cranes migrate from their winter habitat in Texas and surrounding regions via the central flyway through Nebraska to their nesting grounds in Canada, Alaska, and Siberia. The cranes are present in large numbers for approximately two months, depending on the weather here, to the south, and to a lesser extent, to the north, The students are (usually) amazed that such a large and significant migration is taking place in their own backyard.

While here, the cranes are engaged in two major classes of behaviors. First, they are consuming as much food as they can to prepare both for the remaining migration to their summer nesting grounds and to ensure successful nesting. Second, the unmated cranes are engaging in courtship and mate choice behaviors. That the cranes are engaged in so many biologically important behaviors provides for an excellent living laboratory for field research. The students will collect data on both classes of behaviors.

After reading various papers on the topic of Sandhill crane migration, I take the students on a field trip south of Kearney, where we observe the behavior of the cranes. I point out, using examples from Tacha (1988), the various classes of affiliative, agonistic, and courtship behaviors that are being displayed. I then require the students to go out on their own and record data. The students engage in focal animal sampling for periods of 10 minutes on each crane. I require 10 complete records from each student. The students sample behaviors at different times of day and at different locations, to provide an adequate activity budget for the cranes. These data are compiled across observers and times (by me, using software), and discussed in lab. The students then write a paper on the activity budget of Sandhill cranes staging in central Nebraska.

While the students are independently collecting data on Sandhill cranes, we are meeting as a group to discuss independent research projects. These projects are conceived by each small student group. They are discussed in the round by the entire lab, so that everyone has input to the project. The only requirement for the project is that each project must somehow involve the biology of behavior. Approximately half of the independent projects usually involve some form of naturalistic observation, and half involve some type of experimental technique. I regard this as a victory of sorts, since in their previous lab classes in psychology, the students have only been exposed to the various experimental protocols. For example, I

have had student projects in the last several years that have investigated (a) accelerators and decelerators in flirting behaviors, and their differential use by men and women, (b) use of public displays of affection by various age categories as a mechanism for territorial marking, and (c) differences in wayfinding in men and women based on whom they are directing to a location. I have also had experimental student projects, for example (a) differences in attractiveness of pictures depending on whether the person is depicted as married or single, (b) ability of naïve adults to determine the sex of an infant by odor, and (c) differences in men and women in ability to engage in multitasking behavior.

I find the quality of research projects that are conducted using experimental versus non-experimental techniques to be approximately equal. Once the students are trained in nonexperimental methodologies, they appreciate the nuances of the techniques. The students are also better consumers of the literature after learning about these techniques. They are able to more easily distinguish between correlation and causation, and are therefore wary of conclusions drawn in the popular press. Such training also prepares the students for lab classes in such disciplines as developmental psychology, which also uses naturalistic observation for data collection. Students understand the benefits and limitations of observational data in these cases, and are perhaps better able to appreciate the results in such studies. Because of these benefits, I heartily recommend that all students should, at some time in their career, experience a course in nonexperimental methodology.

You may be thinking that I am very lucky to have the spring migration of cranes and waterfowl through the Central Flyway in my backyard, and of course you're right. However, there are many opportunities in every part of the country to observe nature, and teach naturalistic observation. Brooks and Yasukawa (n.d.) and Ploger and Yasukawa (2002) provide many exercises using organisms as ubiquitous as squirrels and local birds. Additionally, naturalistic observation can use laboratory animals in large (compared to body size) arenas (often called "open fields" in the literature). Finally, naturalistic observation can use children or other humans, including those on college campuses. I therefore encourage you to start using this technique to expand the repertoire of lab exercises. Students really do enjoy them.

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# Conducting Research at the University of Wisconsin-Eau Claire's Campus Autism Program

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The purpose of this chapter is to describe how clinical research is conducted at the University of Wisconsin-Eau Claire's Campus Autism Program (CAP). More specifically, the chapter will include a description of four components deemed important in preparing students to conduct research at the undergraduate level.

The CAP was developed as part of a behavioral emphasis within the Psychology department. The Psychology department decided to start an emphasis in behavior analysis for undergraduate students to address a local and national need for therapists trained in behavior analysis to work primarily with children diagnosed with autism. To this end, the emphasis includes three didactic courses in behavior analysis and an internship. Although the didactic courses were already offered within the department, the internship course had to be developed according to the supervision requirements of the Behavior Analysis Certification Board (BACB). The requirements set forth by the BACB require intense supervision by a certified behavior analyst in a university based program. Therefore, the CAP was started as a university program to meet these requirements.

The CAP serves children ages 1-5 who are diagnosed with a pervasive developmental disorder, usually autism. The program therapists include undergraduate students who are pursuing a psychology major and completing an emphasis in applied behavior analysis. The CAP serves four main functions. First, the CAP provides behavioral intervention to young children with autism who otherwise would not receive such treatment. Second, the CAP fulfills the experience requirements to become an associate behavior analyst as set forth by the behavior analysis certification board. Third, the requirements for working at the CAP plus the clinical experience prepare students for graduate school, and as a result approximately 75% of the students attend graduate school immediately upon graduation. The fourth function, and the one to be addressed in this chapter, is the opportunity to engage in research at the undergraduate level.

Training undergraduate students to conduct research begins by requiring students to take the first two courses in the behavior analysis emphasis. The content in these courses is extremely important in preparing students to conduct research. For example, in the introductory course students are taught basic behavioral principles, behavioral measurement, single-subject experimental designs, and ethics. In the second course (advanced applied behavior analysis) students learn more advanced behavioral treatments, how to read and analyze research manuscripts and journal articles, and how to begin developing treatment plans. Perhaps most importantly, students in the advanced course are required to learn and implement the steps for conducting a thesis similar in scope to what is required in graduate behavior analysis programs (minus implementation of the study). This project requires the student to read primary research in behavior analysis, develop a research question, write a research protocol, create data that demonstrate experimental control, write a manuscript similar in scope to one that would be submitted for publication, and defend the thesis via an oral defense modeled after a graduate thesis defense. Although implementing the procedures and collecting data in a semester time frame is not feasible, students have a basic understanding of the steps for starting and completing a study by completing the requirements to this project. At this point students typically begin working and conducting research at the CAP.

To conduct research at the CAP, a student must first develop a research protocol. The experience from the thesis project in the advanced course usually results in students having an understanding of how to begin the initial steps. To aid in this process, a research meeting is offered once per week for an hour. Students can register for one to three credits each semester to participant in this course. The format of the research meeting requires each student to develop their own line of research interests, read past and current literature, write a research protocol, and deliver a power point presentation several times per semester of the current status of their research or

of a particular published article that is related to their interests. In developing research interests and a protocol, the students are required to read articles published in mainly behavior analytic journals. Reading published articles allows students to both review relevant literature and examine a model for how to write a protocol.

As students begin developing research interests and writing a protocol, understanding the type of research typically conducted at the CAP is important. The research conducted at the CAP focuses on a small number of participants, direct measurement of behavior targeted for change, and a demonstration of experimental control of the variables responsible for behavior change. Therefore, the research protocols written and conducted at the CAP primarily consist of single subject designs. Two factors have led to the use of single subject designs. First, data analysis is usually conducted at the individual level in the field of applied behavior analysis. Single subject designs are useful for isolating specific environmental variables, including whether treatment procedures are responsible for behavior change. By using these designs, then, students learn to evaluate whether their treatment is working on a clinical level and to demonstrate experimental control on the research level. The second factor is that CAP serves a small number of children (4-6) individually for an hour four days per week. Given the intensive nature of the therapy provided for a relatively small number of children, single subject designs are the most appropriate tool for analysis.

The array of research topics appropriate for investigation at the CAP is closely tied to the needs of young children with autism. Since the focus of the research must include direct measurement of behavior change, most of the studies to date have been an investigation of either skills that young children with autism need to learn or of procedures that are used to teach these skills. For example, most of the children who enroll at the CAP have little or no ability to communicate (a characteristic of autism). Although there is a myriad of research reports on teaching communication skills to children with developmental disabilities, few studies and little technology exists for teaching young children with autism to talk (vocal verbal behavior). Moreover, a fairly new area burgeoning in applied behavior analysis is verbal behavior. This new area of research involves investigating communication as a functional behavior based on the work of B.F. Skinner (Skinner, 1957).

One study in the area of verbal behavior conducted at the CAP involved teaching vocal skills to two young children with autism. A relatively new procedure, stimulus-stimulus pairing, has been previously investigated in a few studies to increase vocal behavior for children with few or no vocal sounds. This procedure requires a teacher to say a vocal sound while delivering a reinforcing stimulus (pairing the sound with the reinforcer). The child does not, however, receive the reinforcing stimulus for saying the sound. After pairing the sound with a reinforcer for a specified number of trials, the child is observed for several minutes and any vocal the child makes is recorded. An increase in vocal sounds would likely be due to self-reinforcement (not socially mediated) because the vocal sounds were not directly reinforced. Past research has shown an increase in the number of vocal sounds during the post pairing period for some children with autism.

The study conducted at the CAP extended past research by investigating whether the procedure could be used to increase vocals, and subsequently get the vocals under echoic control, for two children who were two years old (Carroll & Klatt, in press). An undergraduate student became interested in the topic while completing the thesis type project in the advanced behavior analysis course. When the student began working at the CAP, she had already developed the protocol for implementing the study. The student also identified a few other students enrolled in the behavioral emphasis who agreed to serve as interobserver and procedural reliability observers. The student who implemented the study was responsible for not only developing the research idea and protocol (with faculty supervision) but also creating data collection sheets, identifying preferred toys, collecting and graphing data, and frequent communication with the faculty advisor.

In the case of this particular study the student was intimately involved in developing and implementing the entire study. Furthermore, the student had a major role in writing the manuscript for publication and, when accepted for publication, was responsible for many revisions. While this particular student worked relatively independently, many of the students working at the CAP need much supervision and assistance for each step in the process. This requires a significant time commitment from faculty that is not necessarily built into their course load. In most cases, the students need considerable time on a daily basis with help writing the protocol and on troubleshooting various problems associated with conducting research.

Conducting research at the CAP involves several important components, summarized in the Table 1. Despite the amount of work involved in helping undergraduate students conduct research, many favorable outcomes are achieved. For example, usually only the top performing students in a department are interested in committing the time

necessary in conducting a study (especially when the expectations are high). Therefore, a faculty member benefits by the opportunity to work with the brightest students. Another favorable outcome is the accumulation of valuable experience for an undergraduate student that is normally reserved for graduate students. The end result is a vita for an undergraduate student that includes numerous conference presentations, lab or applied work experience, and in some cases publications.

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**Table 1**

***CAP Research Components***

1. Coursework in behavior analysis
    - *Basic behavioral principles
    - *Behavioral measurement
    - *Single-subject experimental designs
    - *Ethics
    - *Writing, evaluating, and defending a protocol
2. Internship
    - *Meets requirements of BACB
    - *Intensive training and supervision
3. Weekly research meeting
    - *Read current literature
    - *Develop research interests
    - *Write research protocol
    - *Present power point presentations
4. Professional development
    - *Attend conferences
    - *Present data via posters or symposia
    - *Publish studies in peer reviewed journals

# Research in the Rat Lab: Some Thoughts on Undergraduates doing Behavioral Neuroscience Research

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One size does not fit all; certainly not in the case of rat labs. So, for the sake of creating some context for what is to follow, consider the Wiley F. Smith Department of Psychology's Behavioral Neuroscience Laboratory (the Lab), which consists of "wet" or histology and microscopy lab space across the hall from the College of Arts & Sciences Animal Facility. This latter space houses rats for the Lab as well as the Lab's behavioral testing facilities—the "classic" rat lab. The Lab has existed for about 14 years, mostly in reclaimed storage rooms, having only been located in its current physical space for the last 3 years, and the histology and microscopy lab is slated to change location in the near future. The faculty investigator has had extramural funding in the past and frequently has competitive intramural funding but has a minimal annual budget for operating the Lab. Appalachian State University has about 14,500 students with over 13,000 undergraduates of whom more than 500 are Psychology majors. Now, assume it's Friday at noon in the Lab.

"So now that everybody's introduced themselves, let's get this going. I know it's Friday, and we all have plans. Steph and Lindsey are the only new folks this semester, which makes nine of you and one of me and Olivia [my graduate assistant]. It looks like most of y'all know Steph and Lindsey from elsewhere. They'll be working on the animal care and welfare training this week. You can help them out but don't give answers to the test items."

"Wait, wait a minute Dr. Z., what's with the y'all?"

"You know about my extreme southern background; if there were more of you, it'd be all y'all. Hey, did y'all notice? It's another semester of Warren and the women. Enough. Before we talk about plans for next week, I wanted to remind you that there'll be Monday morning e-mail reminders about each week's schedule. For a few of weeks I'll attach some readings related to our work. We'll start with re-reading a review of the seizure model we use: the 1999 Ross and Coleman paper (Ross & Coleman, 1999)."

"I think we have that."

"You do, but we'll go ahead and re-read and discuss them again. I think we could use it. Megan, what about the T-maze plan?"

"I need schedules. We're running five, 2-hour sessions and since Olivia is doing four, I'll need one 2-hour block from each of us except Steph and Lindsey because they aren't certified yet."

"But we'll work them in to the schedule when they finish the test. The rest of you, give Megan your times after this meeting; let's work this out today. You guys have run this before, and I'm leaving it up to you to finish the adult cohorts. It's only a dozen rats. … So, my plan is to run immunohistochemistry each Wednesday and Thursday, too. Olivia will cut brains on Monday and Tuesday; I think Liz #2 and Jess can select, block sites and do primary on Wednesday, yes?"

"Yep. We got the time. We're running the GABA antibody like last semester?"

"That's the plan Liz #2; the juvenile group is up, which should finish out your honors thesis animals. From y'alls schedules, I'm thinking Megan, Warren, Liz #2 and Margaret will split up the 6-hour run on Thursdays… sound good, do-able? We'll work Steph and Lindsey into the schedule so they can start learning how to do this stuff."

"Yes, yep."

"O.K. then; well, the last administrative things I've got are setting up thesis meetings and plans for NCUR [National Conference on Undergraduate Research]. So, here we go. Ginny, you and I will meet each Monday in the lab from noon to one. Liz #1, we'll meet in the lab on Tuesday from 9:30 to 10:30, which gives you time to make your 11 o'clock. Liz #2, we'll meet on Wednesday between noon and one while you're waiting on blocking sites for the GABA tissue. Work for everyone?"

"Yes. Uh, huh."

"Why don't y'all start to think about making plans for NCUR. We should hear about acceptances in a couple of weeks. I'll go ahead and reserve hotel rooms… "

While the dialogue is a bit contrived, hopefully it hints that undergraduate researchers in a behavioral neuroscience lab spend time learning about brain and behavior, learning how to do science with their hands, learning about working as a team, and using what they have learned to accomplish joint and/or individual projects. Ideally they learn that being part of a research team and doing neuroscience can be enlightening, rewarding, and fun, too. As in most settings, mentoring in the rat lab is about doing good science with student colleagues with both mentor and protégés gaining from each other.

Undergraduate behavioral neuroscience or biological psychology research often involves work in varied settings and using multiple sets of hands-on skills as well as the various activities common to most undergraduate research. Behavioral neuroscience research involves studying relationships between the brain and behavior with biological psychology having a somewhat broader scope in which relationships between bodily processes and behavior are considered. The focus here is fairly "traditional" behavioral neuroscience research using rats to model phenomena of interest, behavioral experiments with or without a prior neural intervention, and histology to examine neural correlates of observed behavior. A facility to house rats, a location to conduct behavioral experiments, and some "wet" laboratory facility for conducting histology are all needed. Somewhere within these areas, or in a separate location, a place that can be set aside for surgery (if needed for a particular study) is also typical. Ideally, a department, college or university run animal facility for housing rats as well as both behavior and histology laboratories are available. Minimally, facilities and practices should meet local requirements for animal care and welfare, as determined by the Institutional Animal Care and Use Committee (IACUC), and follow National Institutes of Health policy (see National Institutes of Health, 2007; National Research Council, 1996) when rats are subjects.

Care should also be taken to prevent risk to personnel, including undergraduate researchers, and abide by good safety practices and applicable government regulations. For example, instruction in the proper handling of rats and availability of lab coats, protective gloves, and breathing protection (generally simple, filtering face masks are adequate) are needed. Similarly, histological procedures often require organic solvents and other toxic chemicals as well as instruments designed to cut tissue (fingers are tissue) which means training, gloves, eye protection, lab coats, etc. and having adequate supervision are necessary. When surgical procedures are used, anesthetics and other drugs are used; these substances are controlled and require a license to obtain and/or hold. While state-of-the-art facilities and apparatus are not a requirement, the bottom-line is that doing good student-faculty collaborative research in a "rat lab" requires some spaces that can have some fairly specific uses and some equipment and supplies; the research is done in some sort of lab.

So how does the undergraduate find his or her way into a behavioral neuroscience research opportunity? It can happen in a variety of ways: asking faculty, responding to postings for research opportunities (the "advertising" process is formalized in some departments and colleges/universities), and being recruited by faculty to identify some common ways. While some undergraduates engage in research only in the summer, most behavioral neuroscience labs operate all year long and have year around opportunities for undergraduate research. Given the time needed to learn useful skills that may or may not be taught in a specific psychology curriculum, second semester freshmen or new sophomores make good candidates for beginning researchers in a rat lab. Interestingly, courses in statistics and research methods, that may not be taken until second year and are certainly useful, may not be as important to initiating a successful behavioral neuroscience research experience as for other areas of psychology.

Regardless of how they find their way to a lab, it is important to realize that students may be able to gain valuable research experience without having to engage in every aspect of a specific research program. For instance, some students only wish to run rats and have interest only in behavior under investigation while others really only care about neuroanatomy. The former undergraduates may not want to learn and do surgery or process brain tissue, and the latter may have no interest in dealing with live rats except when anesthetized or… Of course, the most complete experience is had by the student who runs behavioral and histological protocols, and it is important that *all* students make the scholarly connections between brain and behavior. Undergraduates need to be interested in and "well-matched" with the research they do to truly benefit from the experience. There seems to be no point in requiring doing or observing stereotaxic surgery of a student who runs rats well and understands the logic of behavioral experiments following brain lesions, but who faints at the sight of blood. Rather, it seems the role of the faculty member to build a well-functioning research team based on individual student's interests and, at least to some degree,

aptitudes. Similarly, many undergraduates come to the rat lab with a real interest in investigating an aspect of neuroanatomy. They rarely know exactly what aspect but do know the interest includes perfusing rats and extracting, cutting and processing brains; however, they an aversion to the extensive rat handling that is needed to run, for example, a T-maze paradigm. As they gain time in the lab, individual undergraduate researchers will gradually develop individual expertise, and when it all comes together a rather high quality research team can emerge. It is probably worth noting that diversity, but with compatibility considered, tends to be important for a quality lab team with each member able to gain from the team and each other member (i.e., a team of all honors students might not be the most efficient or effective).

There are many ways to identify or plan undergraduate research projects in a rat lab. The following discussion assumes a couple of things about undergraduate research. First, the best teaching and best learning occur when a faculty researcher and student are collaborating on a project (see Merkel & Baker, 2002 for a good, general discussion). The addition of other student researchers can make the collaborative process even more powerful. Second, guided-discovery is a much more powerful way to learn than pure discovery (Mayer, 2004). In other words, outlined projects that need to be fleshed out conceptually and make use of known and/or developing skills tend to yield good undergraduate research outcomes. So the value of engaging undergraduates as researchers early in their careers becomes clear: the undergraduate researcher with a year or two of experience can take more responsibility for a project than the student who is new to the rat lab. This guided approach is also efficient considering the need for IACUC approval prior to beginning projects; depending on the particular college or university the approval process can take some time. Similarly, this approach allows for training undergraduate researchers in techniques needed to complete projects well and safely as well as in logical and scholarly skills used to develop a project scientifically.

So assuming the faculty member wishes to have control over the research conducted in his or her lab, what might undergraduate research projects be like in such a behavioral neuroscience lab? One fairly successful approach to running a lab with primarily undergraduate researchers (approximately 6 to 10 at any given time) and often a single M.A.-level graduate student is to conceptualize large projects that yield smaller, "thesis-sized" projects that, in turn, contain a couple of relatively simple studies. In-other-words, a program of research works well with an undergraduate research team. Currently, the major research focus in the Lab has been on the nature of exploratory behavior and simple learning and memory of animals prone to and experiencing bouts of sound-induced seizures at various ages. Seizure-resistant rats are made susceptible to generalized, reflex epilepsy and have seizures induced on a particular schedule by undergraduate researchers. Students work in teams on various projects defined by a particular behavior of interest or age for seizure induction. One individual researcher is responsible for each project, which may yield anything from data for the lab to a presentation at the National Conference on Undergraduate Research (NCUR; e.g., *Learning and performing a task that requires working memory is affected by sound-induced seizures in adult rats*, Waddell et al., 2007) to a senior honors thesis (e.g., *Exploratory behavior in Long-Evans rats after adult audiogenic seizures,* Price, 2007). Teams produced subjects and control groups, and for the thesis project, Ms. Price benefited from her team's help running open field and object preference tasks. Team members benefited from shared authorship on a related presentation at NCUR. Additional projects result from relevant histology conducted after behavioral testing. Undergraduate researchers perfused animals and processed tissue using immunohistochemistry to visualize GABAergic (a source of inhibition) neurons in the seizure-prone midbrain. Subsequently, cell densities across seizure-prone and control groups were computed using microscopy yielding a submission for the Society for Neuroscience meeting (*Acquired audiogenic seizures increase the proportion of GABAergic neurons in the dorsal nucleus of lateral lemniscus,* Glenn et al., 2007). Finally, projects may evolve serendipitously from a general line of research.

Students have conducted a handful of investigations concerning the mechanics of the acquired reflex epilepsy model used in the Lab (e.g., *Sudden or gradual sound onset differentially affects audiogenic seizure severity in developmentally primed rats,* Dravland, Clapp & Zrull, 2005). In each of these examples, one undergraduate (typically the first author on a product evolving from the project) had responsibility for developing the experiment(s) and organizing team involvement in collaboration with the faculty researcher. Often, with a competent team leader, the faculty researcher has a collaborating scientist role with the lead undergraduate researcher but a technician or consultant role with the team when experiments are being run.

While one size does not fit all as far as specific research goes in the rat lab, undergraduates can do quality behavioral neuroscience research and the opportunity can help them achieve their goals. Working in a rat lab does require learning some unique abilities (e.g., handling rats, possibly doing stereotaxic surgery and intracardial perfusions, microtoming tissue, cleaning slides, doing digital miscroscopy stereology, etc.) in addition to developing skill in scientific reasoning and research methods (e.g., reviewing literature, designing experiments, doing statistical analyses, etc.) and student preparedness will depend a great deal on the specific curriculum of a particular program. Given the learning curve for student researchers as well as safety considerations and various regulations, working with undergraduates in a behavioral neuroscience lab offers an ideal opportunity for faculty to guide discovery and engage in collaborative researcher with undergraduates. Strong research teams can develop with student-student collaborations becoming common, and a program of research can benefit from having undergraduates in the lab for two or three years. Longer duration relationships afford the opportunity mentoring to truly develop with discussions about life, the future and being a person in addition to learning to do science and function as a scientist. And, of course, with mentoring come some unique opportunities for both the mentor and protégé like eating brains and eggs in Missoula, Montana biker hang-out at 4 a.m. after a long day, and night, of discussing neuroscience and rats.

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# Learning from Chimpanzees: Internships at the Chimpanzee & Human Communication Institute

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The Chimpanzee and Human Communication Institute (CHCI) provides a unique opportunity for research and education about human's sibling species, chimpanzees. Additionally CHCI provides sanctuary for three chimpanzees-- Loulis, Tatu, and Dar. CHCI's primary goal is to ensure the well-being and protection of these chimpanzees by guaranteeing their freedom from invasive or disruptive research, by maintaining a safe, healthy, and interesting environment, and respecting and providing for their individual needs. CHCI's second goal is to encourage in other humans respect, responsibility, and compassion for all of our fellow apes by offering unique, engaging educational programs and resources to elementary, secondary, and post-secondary students and the public at large. CHCI's third goal is to promote quality, humane research on the communication and behavior of the chimpanzees in our care, as well as research that furthers both the care of captive chimpanzees and conservation efforts to save chimpanzees from extinction by serving as a resource for the students of Central Washington University (CWU), its faculty, and visiting scientists. In fulfilling this mission, CHCI provides unique research opportunities for undergraduate students.

CHCI is situated on the CWU campus in Ellensburg, WA, which facilitates student involvement. Student interns learn research skills in a hands-on approach. New interns learn the basics to begin chimpanzee research and husbandry. They learn to identify individual chimpanzees, a behavioral taxonomy, a system of abbreviations, and observational skills. They learn basic husbandry including appropriate cleaning, meal preparation, and recordkeeping. CHCI's philosophy of care is one where research and care blend seamlessly. This is necessary for research that examines the interactions between caregivers and the chimpanzees. Much of the research at CHCI involves analysis of signed conversations between the chimpanzees and their caregivers. If the caregiver is not a friend of the chimpanzees, this could hinder conversations and data collection. This is true of any research where the chimpanzees are willing participants in the research. All of the research at CHCI is observational and the chimpanzees are never forced or coerced into participation. Thus the challenge to the researcher is to create an experimental paradigm that is interesting and naturalistic. Simple observations also require affinitive relationships between chimpanzees and observers so the chimpanzees engage in natural behaviors rather than constant reactions to observers. Thus by virtue of our philosophy, students are involved in both care and research. Interns may choose to pursue further training and experience in husbandry and research. This involves taking a course in American Sign Language and completing a sign reliability test at 85% or above. This establishes inter-observer reliability in written records of chimpanzee signs. Interns learn many research skills in an applied setting.

Most student interns major in the Primate Behavior & Ecology program, which includes a second major in biology, anthropology, or psychology. A few other students have other majors such business or criminal justice. At CHCI undergraduates have the same opportunities as graduate students.

An avenue for non-CWU student internship at CHCI is the annual Summer Apprentice Program. This is a 10-week intensive research and husbandry experience. Applicants learn about the program and download the application from www.cwu.edu/~cwuchci. Qualified applicants demonstrate a desire to participate in research and to gain experience in an environment that puts the chimpanzees' needs first and must have one year at a college or university. Some individuals apply while working toward a degree while other are post-degree or in graduate school and applicants from all majors and nationalities are welcomed.

## Types of Data Collection at CHCI

### *Written Databases*

Chimpanzee caregivers have maintained a variety of written records of the chimpanzees' behaviors and care. These provide written databases that can be utilized for future study.

In the first 14 years of the CWU project all interns recorded a **Shift Report** at the end of their shifts. These are written records of interns' shifts including notes on the chimpanzees' behaviors, signing, and interactions. These reports provide opportunity for research in chimpanzee behavior and communication, including longitudinal research.

Recently an undergraduate intern utilized this database for a science honors thesis, which coded instances laughter, play, and humor. Numerous undergraduate interns assisted in the coding and data entry process. This project resulted in three presentations (Wallin, Jensvold, & Sheeran, 2006; Wallin, 2007; Wallin, Jensvold, & Sheeran, 2007). In another study early records were analyzed to document phrase development as Loulis acquired signs from other chimpanzees (Fouts, Jensvold, & Fouts, 2002; Jensvold, Fouts, Hood, Fouts, & Waters, 1999).

A later version of the Shift Report is the **Berm Log**. When the chimpanzees are in the outdoor enclosure, interns observe the chimpanzees and make written records of their behaviors. This database was utilized for a study that showed a positive correlation between the temperature and the time the chimpanzees were outdoors. Numerous undergraduate interns assisted in supervision of the project and the coding process. The results were presented in a student co-authored paper (Puffer, Jensvold, Fouts, & Fouts, 2006).

All interns who are chimpanzee caregivers learn detailed record keeping skills as they maintain written records of the chimpanzees' signs and diet. This includes **Sign Checklists**, which are daily records of which signs the chimpanzees used. Additionally in **Sign Logs** interns record observations of chimpanzee-to-chimpanzee signing, private signing, multiple sign utterances, and other interesting interactions between the chimpanzees and their caregivers. Interns also are involved in data entry and these records provide longitudinal data bases for future analysis.

### *Videotaped Records*

Deborah Fouts developed the **Remote Videotaping** procedure (RVT) while a graduate student at CWU. In this procedure she focused four cameras on one chimpanzee enclosure. The camera operator controlled the cameras from a remote location. No humans were allowed around the chimpanzees during videorecording, which eliminated any potential cuing from humans. D. Fouts transcribed all instances of chimpanzee-to-chimpanzee signing from the videotape. In her thesis she reported Loulis' signing to the other chimpanzees (D. Fouts, 1984; 1994). Later an undergraduate intern summarized the other instances of chimpanzee-to-chimpanzee signing and presented this at a scientific conference (Jaffe, Jensvold, & Fouts, 2002). Another graduate student Bodamer reviewed the same videotapes for instances of private signing. The chimpanzees signed to themselves, like humans talk to themselves. (Bodamer, Fouts, Fouts, & Jensvold, 1994). Using the RVT, graduate student Jensvold recorded the chimpanzees for 15 hours and found 6 instances of imaginary play (Jensvold & Fouts, 1993).

In **Video Follow,** biannually and systematically interns videorecord the chimpanzees over a 2-week period. Interns learn videotaping skills while creating a longitudinal database, which is then available for research projects. Additionally interns videorecord special events and interesting behavior for the **Adventitious Videotapes** database. The Dialect study has made extensive use of the Video Follow and Adventitious Videotape databases. The Dialect study compares the forms of the chimpanzees' gestures to videorecordings from other field sites. Interns are involved in all aspects of the project including coding the videotapes, data analysis, and presentations at professional conferences (Fouts, Haislip, Iwazuk, Sanz, & Fouts, 1997; Fouts, Fouts, Daspit, Opperman, Pastore, & Sloan, 2001; Fouts, Fouts, Sloan, Daspit, Kuykendall, & Reider, 2001; Kuykendall, Reider, Daspit, Sloan, Fouts, & Fouts, 2002; Hicks, Lackey, Reider, Shiau, Fouts, & Fouts, 2003). The Laughter study also utilized the video databases. In this study interns coded information about play and laughter. Results of this study show a positive correlation between play bout duration and the presence of laughter as reported in two student co-authored conference presentations (Jensvold, Sheeran, Halberg, & Keyser, 2006; Halberg, Jensvold, & Sheeran, 2007).

Signed conversations are a natural part of all interactions between the chimpanzees and their caregivers. This creates an opportunity to systematically manipulate conversational variables. Conversations are videorecorded for a particular study or as part of an ongoing conversational database. Undergraduate interns act as camera operators and interlocutors. Additionally interns

have transcribed signs from the videotapes and have classified responses from transcripts. Prior to this the interns were tested for inter-observer reliability. Undergraduate interns often assist graduate students with these projects while gaining advanced skills in research techniques. Studies using this procedure have documented the chimpanzees' responses to misunderstandings (Jensvold & Gardner, 2000), mispronunciations (Davis, 1995; Radeke, 1994), social referencing (Hood, 1999), strangers (Hartel, 2006), questions versus statements (Simpson, 1994; Tierney, 2005), differing conversational styles, (Kennerud, 1993) and their use of sign modulation (Shiau, 2005) and categorization (Beaucher, 1995).

## *Live Data Collection*

Numerous studies at CHCI have utilized live data collection to address a specific question. Specific procedures include focal sampling in which the observer records the behavior of a single chimpanzee or scan sampling in which the observer records the behavior of all of the chimpanzees. Continuous recording methods provide the amount of time the chimpanzee engages in behaviors. This method was used to compare to chimpanzees' responses to various types of visitors (Sanz & Jensvold, 1997). Time sampling methods record the behavior every set amount of time, for example every 15 sec. This procedure was used to examine the chimpanzees' activity budgets (Jensvold & Fouts, 1994; Jensvold, Kowalski, Radeke, & Fouts, 1993; Martin, Jensvold, Fouts, & Fouts, 1999), social hierarchy (Hayashida, Grandia, Blake, Eburn, Jung, Parker, Jensvold, & Fouts, 2001), use of their enclosure (Sanz, Fouts, Jensvold, & Fouts, 1999; Tecot, Jensvold, & Fouts, 1999), and their responses to food forages (Hartel, Jensvold, Bowman, Fouts, & Fouts, 2004) and environmental enrichment (Jensvold, Fouts & Fouts, 2001; Bowman, Jensvold, Fouts, & Fouts, 2002; Waters, McDowell, Jensvold, Fouts, & Fouts, 1999; Sanz, King, Jensvold, Fouts, & Fouts, 1998; Derbawka, Jensvold, Fouts, & Fouts, 2003). Scan samples have told us about the chimpanzees' proximity to each other (Opperman, 2001). The number of co-authors and references are a good indicator of the level of student involvement. Undergraduates are usually involved in all aspects of the project including design, data collection, analysis, and write up.

The longitudinal nature of the CHCI research and the ongoing data collection provide numerous opportunities for student involvement. Additionally students gain hands on experience in the seamless role of caregiver and researcher, a role that takes the chimpanzees on their own terms.

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# Archival Research in Forensic Psychology

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Conducting research with undergraduate students is always rewarding and challenging. Research that involves clinical patients increases both the rewards and the challenges. Research that involves clinical patients who have a history of criminal behavior and/or violence increases the rewards and the challenges still further. For the past decade, undergraduate students have played an integral part in an ongoing and expanding research project focusing on mentally ill criminal offenders at a local forensic facility. Their involvement and skill level have varied over the years but it has always central to the success of the effort. This chapter will describe these efforts, the typical duties students carried out, some of the successes and some of the challenges.

## What is the Forensic Unit?

Forensic psychology tends to be inherently interesting and certainly does not suffer from a lack of sex appeal. As a result, students interested in conducting research in forensic psychology do not tend to suffer from the same initial misconceptions about research being boring that other students do. These students tend to be attracted to it like moths to a flame. Students get excited about the possibility of working with so called criminals. They have visions of axe murderers, sexually violent predators and serial killers dancing through their heads. Nonetheless, the daily grind of our research tends to be different than the sensational aspects that most students think of when they think about forensic psychology.

We collect our data at a maximum security forensic hospital (i.e., the forensic unit) that serves the entire state. While the types of patients have evolved over the last decade, they have remained somewhat constant. Patients generally have mental health problems and have some involvement in the legal system. They could be in the facility for a pretrial evaluation, awaiting sentencing, participating in some form of treatment, or were transferred after they were sentenced for a crime. These patients could include people who are being evaluated for competency/insanity or found incompetent/insane, people who were sentenced to prison and developed mental health problems that he prison could not address adequately, people who were civilly committed at a local hospital and became too aggressive for an unsecured facility, and sexual offenders. Even though axe murderers and serial killers tend to be rare, there are a variety of cases that still peak the interests of student researchers.

The sex appeal of forensic psychology and conducting research with this type of population tends to draw students with a wide variety of abilities and personalities that should be considered before they participate in forensic research. As a result, we have developed an informal screening process for potential research assistants over the years. Given the sensitivity of the data and the potential dangerousness of these patients, we tend to only select students who the two psychologists working on the project know personally or have been referred by current research assistants. Though the number of students varies, there are about 3-5 students working on the project at any given time.

In addition to some kind of personal knowledge of the potential research assistants, we take a preliminary tour of the facility in order to gage their comfort level around potentially dangerous and mentally ill individuals. In the past, some students have decided after realizing the nature of the facility that they were not comfortable and were not going to pursue the opportunity. We also conduct an informal interview to better determine the emotional maturity and overall personality of the student, both because of the research itself and the importance of working with the team. All of these steps are taken to insure a good match between the student, the focus of the research and the team itself.

## Typical Tasks Involved in Our Forensic Research

Over the years, the types of duties that the research assistants engaged in have varied with changes in the facility and our role in the overall facility. As a result, the duties I will describe may not occur currently but have occurred at some point during our research. One aspect that should be mentioned is that the research does not occur in

isolation. Students and I work closely with psychologists, psychiatrists, psychology interns, social workers, and all the staff to provide information that is also usable for clinical purposes, not simply for research purposes. If not for the need to provide good care to the patients, our research would not exist. Some of the information we collect is used specifically for evaluation and treatment purposes by the staff. As a result, we take pride in knowing that our efforts can make a difference in the lives of real individuals.

Research assistants are primarily responsible for coding archival data from the institutional files at the facility. These files generally contain information about the individual's mental health history, criminal history, social and family history, employment history, substance abuse as well as their institutional behavior and response to any treatment efforts. Students examine these records from multiple facilities, as written by multiple professionals, and often consisting of inconsistent opinions and findings to arrive at reliable and valid personal histories of these individuals. In training research assistants, they code multiple practice files and then compare their responses to previously trained research assistants efforts on identical files. Trained research assistants also assist in filling out some basic information for risk assessment instruments that other professionals use in conducting formal evaluations of the forensic patients.

A second task that the research assistants assist with is the psychological testing of patients. Students may sit down on the individual wards or bring patients to a central conference room where patients fill out a standard packet of psychological questionnaires upon admission. This practice allows the students to get some hands on experience with the patients instead of simply coding files. Students also sit in on actual forensic interviews for patients with a staff psychologist and/or advanced graduate students. This opportunity gives the students yet another chance at patient contact. Typically, after the interview the staff psychologist sits down the graduate students and the research assistants to discuss the particulars of the interview and any questions they may have about it. Although it is not directly related to the research itself, the students really enjoy this unique opportunity and it contributes to their understanding of the different psycholegal issues relevant to the research. It also provides an additional motivation for the long drive and sometimes less than thrilling hours of coding files.

## Successes of Our Research

Students have found this experience very rewarding for a variety of reasons. Students have routinely commented that the experience and the resulting discussions have given them an abundance of practical knowledge. Students who work with us have not only used this knowledge in psychology graduate programs but also law school and law enforcement. Furthermore, the research gives them great insight into our legal and mental health systems. For example, students have commented that they have learned more about mental health working on this research than they ever did in their abnormal psychology class. Students continually comment on the importance this practical knowledge has played in their overall college education.

In addition to the practical knowledge that students routinely acquire, we also attempt to encourage students to acquire professional product from their experience, especially those interested in attending graduate school in psychology. Our students have routinely been co-authors on scholarly presentations at national and regional conferences. They have also increasingly taken the lead on projects that have been presented at these same conferences as well as regional student conferences. A more intimidating and time consuming aspect has been publishing these projects in professional journals. Nonetheless, students have been co-authors and first authors on professional publications. We have even had some recent success in students applying for and receiving small grants for their research. These projects have focused on a variety of questions. Do different types of sex offenders exhibit different cognitive distortions? Can we accurately predict future violence with structured and actuarial measures of violence? Do scores on a self-report measure of psychopathy predict treatment success? No matter the project, we believe that the unique experience and the professional product we encourage has helped our students gain admission to some of the most prestigious law schools and graduate programs in the country.

## Challenges of Forensic Research

There also are a number of challenges to conducting this type of research, some challenges are generalizable and some are inherent to our specific circumstances. Most research focuses on the importance of protecting the safety and well-being of the participants. It is rare that researchers must also look out for their personal safety as well. Nonetheless, it is an important issue in working with

individuals who are mentally will and have a history of violence. However, we are very proud that not a single student has been verbally or physically assaulted in all of our time working on the research.

Besides the physical danger, there are additional challenges. There is a significant time commitment for the students. Students typically travel two hours both ways to the facility in order to be onsite for three hours once a week. Having a 5 hour block of time is often difficult and entails significant planning by the students and myself. Working within any government agency can be political and interfere with the scientific research process. Our situation is no different. There are professional turf battles that prevent us from conducting the research in the most efficient way. In addition, we are dealing with real human beings that are facing potential legal action and are mentally will. These patients may be less than forthcoming, poor historians, or simply distort the truth to suit their own agenda. Educating students about these issues and still conducting meaningful and quality research can be challenging. Furthermore, the mental health system and the legal system have changed significantly and necessitated changes in our research. For example, when we first started the research a minority of the patients at the forensic unit were sex offenders. Given the political and public push for additional limitations for sexual offenders, they now represent the majority of our participants. In addition, patient turnover has become much more rapid. Patients used to be in the facility for months or years and now may only be hospitalized for weeks or days. This change has meant that gathering meaningful data has become even more difficult.

Finally, as mentioned before it takes a unique individual to be able to read about the most vile and despicable acts that humans are capable of perpetrating. Students have to be able to read and discuss violence and explicit sexual behaviors. Because of the explicit nature of this information, it is quite common for professionals and the students to cope by using humor when appropriate. This approach often requires additional emotional maturity from the students to know when it is appropriate and when it is not appropriate. We have had some students who have had difficulty and we have parted ways with students who have been unable to carry themselves professionally. For example, some students have had difficulty dressing appropriately for interacting in a facility that housed sexual offenders, instead of dressing like they were going out on a Saturday night with their friends.

In addition to professional maturity, there are other qualities necessary in the students who work on this project. They need to be able read this disturbing information in a detailed and meticulous manner, which is especially difficult given that the data is collected for clinical purposes and not done to ensure reliable and valid scientific data. Students also need to maintain a high degree of confidentiality. Not only are they dealing with sensitive clinical data but there are also legal consequences that demand even a greater level of confidentiality. Confidentiality becomes even more difficult when friends and relatives happen to read or see media reports of a high profile case and ask the research assistants about patients the media may report are at the forensic unit. Many of these issues fall under the review of an Institutional Review Board (IRB). Our research must pass through the review of the University IRB as well as the facility IRB. However, the IRB expectations are usually in line with our own professional expectations and present few significant hurdles, especially since much of our research is archival or simply involves accessing existing clinical information that would have been collected without our involvement.

## Conclusion

Conducting forensic research with undergraduate students has been extremely rewarding and provides a unique experience that few other students are afforded. Working as part of our research team provides students with an opportunity to learn about the capabilities of humans beings, while learning a great deal about the mental health and legal systems. Despite the challenges that working with young men and women on this type of research can pose, the benefits have certainly outweighed the costs.

# Neuroscience Research

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Neuroscience is a relatively young field, having emerged as a separate discipline within recent decades. Research in neuroscience encompasses all aspects of the nervous system from the cellular mechanisms of nerve cells to the brain's governance of behavior and cognition. Psychology, along with Biology, Physiology, and other disciplines is a major contributor to the interdisciplinary research of the field.

Indoctrination of students into neuroscience necessarily involves research experience. Directors of graduate and undergraduate Neuroscience programs agree that the most important preparation undergraduates can have for graduate school entry in neuroscience is research experience (Boitano, 2001). Indeed, a recent survey from the Association of Neuroscience Departments and Programs (ANDP) indicated that 95% of accepted students in neuroscience graduate programs have some research experience (Stricker, 2005). Students who plan to work in the neuroscience field immediately after graduation (e.g., lab technician, research assistant) also find applied research experience essential.

For a successful undergraduate research experience, the ideal interaction between teacher-student results in more than a simple transference of knowledge. Specifically, students in neuroscience are typically engaged in the discipline in an ever-increasingly independent and applied way. An apprenticeship model of learning fits well with student engagement in scientific application (Lave, 1996; Lave & Wenger, 1991). Apprenticeship as a model of learning puts greater emphasis on the student as a participant in the learning process. Essentially, learning becomes more self-directed as the student takes on a new identity while integrating into a community of practice (Lave & Wenger, 1991). In this case, the new identity is an actively engaged scientist within the neuroscience community of practice. The extraordinary growth of neuroscience research internationally has left students hungry for real experience (Mickley, Kenmuir, & Remmers-Roeber, 2003). The process of students developing a research partnership with their mentors in order to develop their research skills at all stages, from conception to publication, rather than simply joining the faculty members' existing project is the basis of a model neuroscience mentorship program described by Mickley et al. The outcome assessments have supported this model as an exceptionally good approach to undergraduate neuroscience education.

The apprenticeship model is student focused. Students gain independence as active neuroscientists as their skills, knowledge, and confidence develop. The teacher and the student become interactive partners in the learning process. Both the teacher and student, therefore, are learners in this dynamic (Lave, 1996). This partnership allows both parties to collaboratively formulate ways of applying the scientific method to answer a variety of questions, and transfers to the student the experience and confidence necessary to independently join the neuroscience community. I have personally found this approach to be extremely effective for engaging top caliber students in their chosen discipline early in their undergraduate years. After brainstorming through our mutual interests, for example, I have provided extra brain tissue from my own research for independently tailored analyses and have co-written a peer-reviewed grant proposal with an especially astute sophomore.

Given the heavy research focus and unique interdisciplinary blend of this particular community of practice, taking an active role in the neuroscience community requires research skills flexible enough to be applied to a variety of situations in a variety of scientific disciplines. The apprenticeship model is ideal for providing appropriate neuroscience training. Also, apprenticeship should be viewed as a process that requires time. This underscores the importance of undergraduate research in neuroscience. Ideally, students who become engaged in research early will be more confident, gain more skills, and integrate more smoothly into the community.

A unique challenge of student involvement in neuroscience research involves instruction flexibility. Interested students may be majors in a variety of disciplines, including Psychology, Biology, and Chemistry. The neuroscience community is primarily formed through a network of interactive, collaborative laboratories and departments. According to a recent survey, 64% of undergraduate

and graduate neuroscience programs involve multiple departments, whereas only 18% of these programs are housed specifically in neuroscience departments (Stricker, 2005). Given this unique environment, an important skill for undergraduate students is to gain the knowledge and confidence to seek out expertise as needed in a collaborative network of scientists. In other words, it is important to choose appropriate mentors and understand the scientific theories well enough to know which questions to ask and where to find the answers. Since most neuroscience training spans multiple departments, the expertise and interests of faculty are likely to depend on the institutional availability of faculty initially hired for a variety of positions. Specific student research interests and backgrounds may be equally as variable.

Successful navigation of the variability inherent to an interdisciplinary area such as neuroscience can be supported by promoting understanding among scientists regarding neuroscience research. It is not uncommon for physical science departments to be less than inclusive of psychology as a science. Likewise, psychologists may not fully grasp the complexities of engaging in neuroscience research or developing a multidisciplinary network. Methods of promoting open communication among departments and colleagues regarding the unique challenges of neuroscience research can be beneficial to faculty and students alike within the discipline. Examples of ways to open communication and promote understanding among faculty and students across multiple disciplines may include colloquia, open discussions, and formal or informal research presentations or journal clubs.

Although smaller undergraduate institutions are believed to be at a disadvantage to engage in undergraduate neuroscience research (Faculty for Undergraduate Neuroscience, n.d.), 69% of undergraduate neuroscience programs are at primarily undergraduate institutions (Stricker, 2005). Interviews with undergraduate students in several laboratories indicate that the success of the laboratory in engaging undergraduates in research depends on four important aspects: offering unique experiences and skills that cannot be found elsewhere; maintaining an open, collaborative atmosphere that values undergraduate input; clearly identifying the natural progression from mundane tasks to independent responsibility; and challenging critical, scientific thinking and ethical applications (Benson, 2002).

Setting up neuroscience research programs and opportunities for undergraduate students can be a daunting task, but resources are available to help. Project Kalaidoscope (PKAL) advocates for the development and support of undergraduate programs in science, technology, engineering and mathematics. Faculty for Undergraduate Neuroscience (FUN) provides a unique support system for undergraduate neuroscience programs and faculty. PKAL and FUN have collaborated in several workshops regarding the development of undergraduate neuroscience programs. The first of these workshops in 1995 resulted in specific goals for undergraduate neuroscience education. These goals include critical thinking, scientific communication skills, highlighting the interdependence of the discipline, and better understanding of science and its role in society (summarized in Kerchner, 2005; Ramirez, 2005). Specific resources associated with establishing and improving undergraduate neuroscience research can be found at:

- Faculty for Undergraduate Research (www.funfaculty.org) - FUN publishes the Journal of Undergraduate Neuroscience Education (JUNE), an online peer-reviewed mechanism for undergraduate neuroscience educators to share teaching techniques, curriculum development issues and laboratory exercises. (www.funjournal.org)
- Association of Neuroscience Departments and Programs (www.andp.org) - ANDP provides a discussion forum for neuroscience research and training issues and is a resource for neuroscience education information for undergraduate, graduate and postdoctoral students.
- Project Kaleidoscope (www.pkal.org) has published practical advice and best practices in undergraduate research in their yearly, internet-accessible *What Works* volumes since 2004.

Providing valuable research opportunities in undergraduate neuroscience involves three important but challenging components: space, time, and funding. One way to address these issues efficiently is to combine teaching and research space whenever possible. Adding lab components to biopsychology, psychopharmacology and other neuroscience-oriented courses can provide a reasonable mechanism for minimizing time and resource investment while maximizing space utilization. For strategic planning of research space, Project Kaleidoscope provides facilities planning resources and workshops and both Project Kaleidoscope's Keck consultation program and APA review consultants can provide on-site expert advice on facility development. Limited space need not preclude laboratory development though. Harrington (2006) provides a unique manual for focusing a course or laboratory on research methodology specific to neuroscience. In this type of course, student-designed projects and scientific papers can actively involve students in learning the

process of neuroscience research. Laboratory exercises can also be conducted easily within limited budgets. For example, sheep brains and cow eyes for dissection are inexpensive and are available from some online vendors formaldehyde-free for added safety and reduced disposal costs. Other laboratory projects and supplemental materials such as histology slides and electrophysiology manuals are available on the Journal of Undergraduate Neuroscience website. Online resources such as the mouse brain library (www.mbl.org) and the functional MRI data center (www.fmridc.org) provide easily accessible databases of animal and human brain images. Sinauer Associates have CD-ROM based activities in neurophysiology and are developing a database of NeuroLabs that will include affordable and accessible options for even the most limited budget and space considerations.

An important aspect of neuroscience research education is the ethical use of animal and human subjects. It is important to match subject use to the specific objectives of the laboratory or research project in order to balance educational value and subject utilization. Although Institutional Review Board (IRB) considerations are well known to most psychologists, a majority of neuroscience research involves animal (primarily rodent) rather than human subjects. While the IRB is charged with the protection of human participants in research, the use of animals is governed by Institutional Animal Care and Use Committees (IACUC). It is important in IACUC proposals to demonstrate consideration of the three R's (reduce, replace, refine) since every animal subject's use must be justified. To this end, when designing laboratory activities or training undergraduates in research techniques it is important to educate students about animal use, to provide as many options as possible that do not involve live animals (e.g., using tissue from a previous study or coding behavior using recordings of animals), and to thoroughly justify the number of animals necessary for the scientific goals of the project. Ethical considerations should be balanced against the irreplaceable value of training undergraduate students with neuroscience interests in live animal techniques. Students involved in animal research quickly gain greater understanding and respect for the research process as well as the time investment required for data collection. These skills are invaluable to students learning to design independent projects. I have found that even the most anxious and inexperienced students gain confidence and skill in handling animal subjects when appropriate training and individual attention is provided. The skills and confidence from this training contribute an important component to the development of the student as a member of the neuroscience community.

Another valuable option for students seeking experience in neuroscience research is involvement in one of the increasingly popular undergraduate summer research programs. It was only after completing one of these summer research programs that I realized I had finally found my niche in psychology. The program was instrumental in my acceptance to graduate school and my early involvement in the neuroscience community. According to self reports from summer research programs, 60% of perceived benefits involve growth toward becoming a member of the scientific community (Hunter, Laursen, & Seymour, 2007). High academic achievers should be encouraged to apply to these programs, which typically match students to available faculty with compatible interests. More information about undergraduate neuroscience summer research opportunities can be found at the following sites:

- Abbott Laboratories science internships for undergraduates (http://abbott.com/global/url/content/en_US/50.60.10.10:10/general_content/General_Content_00167.htm)
- National Science Foundation Research Experiences for Undergraduates program (www.nsf.gov/crssprgm/reu/reu_search.cfm)
- U.S. Department of Energy Science Undergraduate Laboratory Internships (www.scied.science.doe.gov/scied/erulf/about.html)
- American Physiology Society summer research opportunities, sorted by state and institution (www.theaps.org/education/ugsrf/SumResLINKs.htm)
- Westminster College Psychology Department list of neuroscience summer opportunities (www.psych.westminster.edu/psybio/internops.htm)
- Howard Hughes Medical Institute funded summer research in neuroscience (www.hhmi.org/grants/reports/scienceopp/main)
- Weizmann Institute of Science in Israel summer research opportunities for international students (www.weizmann.ac.il/ acadaff/kkiss.html)
- Harvard research opportunities for minority students underrepresented in the sciences (www.hms.harvard.edu/dms/diversity/shurpintro.html)
- New York University Center for Neural Science summer research program in neuroscience (www.cns.nyu.edu/undergrad/ surp)

Scientific discovery encompasses critical thinking and flexibility of application in order to apply classroom knowledge. Internationally, the

scientific community is highly skilled, making it especially important that our students not only integrate into the neuroscience community, but that their passion for discovery and science be stimulated. This is the only way to ensure the future generation of scientific advancement. Hands-on research experiences are essential to the development of critical scientific skills. We would not expect a surgeon to perform surgery without practice or an artist to learn to paint from a how-to book. Likewise, we cannot expect to produce proficient scientists without first having students train and practice the scientific method and basic research skills. Appropriate faculty-student collaborative experience is essential to the successful intromission of our undergraduate apprentices into the neuroscience community.

Additional resources for faculty and students:

- Society for Neuroscience (www.sfn.org) - SFN is world-wide professional organization with approximately 37,000 members (and still growing). SFN has links to resources for undergraduates, including summer training opportunities and undergraduate scholarships. SFN offers discounted rates for undergraduate student membership and there are numerous regional chapters of the society. FUN poster sessions for undergraduates are held during annual SFN meetings. ANDP is also closely affiliated with SFN.
- Web Guide to Research for Undergraduates (www.wbguru.neu.edu/devices) - hosted by Northeastern University, this site is an undergraduate student-oriented resource for research involvement. Although undergraduate students are the target audience, some information (e.g., learning contracts, keeping research journals) may be beneficial to faculty as well.
- Undergraduate journals for publishing neuroscience research (updated version of the journals listed in Willoughby & Lom, 2003)
  - *Journal of Young Investigators* (www.jyi.org) - JYI publishes under-graduate research in science, math and engineering
  - *Journal of Behavioral and Neuroscience Research* (http://academic2.strose.edu/Math_And_Science/flintr/jbnr) - JBNR is affiliated with the North East Undergraduate Research Organization for Neuroscience (NEURON). JBNR pub-lishes undergraduate research in neuro-science and psychology, and is especially interested in areas that utilize neuroscience, psychology, and behavioral techniques.
  - *IMPULSE* (http://impulse.schc.sc.edu) - IMPULSE is an international under-graduate journal. Accepted articles are published immediately online.
  - *Indiana Undergraduate Journal of Cognitive Science* (http://www.cogs.indiana.edu/iacs/journal.html) - online publication of under-graduate articles in any area of cognitive science.
  - *Journal of Undergraduate Sciences* (www.hcs.harvard.edu~jus/home.html) - JUS publishes undergraduate research in all areas of science

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# Using the Web for Student Research


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Since the middle 90's the web has grown into a powerful research tool for psychologists. The reasons to do web research are varied but some of the major reasons include sample diversity, access to limited populations, and even cost (Musch & Reips, 2000). While the use of the web as a research tool presents many challenges such as loss of control of the environment, it has repeatedly been demonstrated that for many research questions the web is a valid means to collect data (Krantz, Ballard, & Scher, 1997; Krantz & Dalal, 2000). This chapter aims to describe the nature of web research and its uses as a tool for student research, and to give some guidelines both to the practical and ethical issues regarding web research.

## Nature of Web Research

Most psychological research conducted online makes use of web forms, which are familiar as the means of consumer purchasing over the web. It did not take long for psychologists to see forms as a means for collecting data from participants over the web (Keiley, 1996). A simple web study involves a minimum of three web-pages and a program to receive the data. The minimal web-pages are an informed consent page with a link to the study page, the study page containing the web form with a submit button, and a debriefing page. The program to receive the data resides on a web server and communicates through what is called a Common Gateway Interface (CGI). Pressing the submit button on the study page transmits the form data to the CGI program, which records the data in a file and then redirects the participant's browser to the debriefing page. It certainly is possible to approach web research using more sophisticated tools, but with these few tools it is possible to do web research.

## Online Research Case Study: Hanover College's List of Online Psychological Studies

Since the development of web forms, online research has increased dramatically. Since 1995, a list of web-based psychological studies has been maintained at Hanover College's web site (http://psych.hanover.edu/research/exponnet.html) (Krantz, 1995/2007). This site has grown from less than 2 dozen studies when it appeared to over 250 studies currently online. The activity of the site has also grown. In 1995, the site had only 1300 hits. In 2006, the site had over 380,000 unique visitors. In 1995, only 7 new studies were posted after the original list. In February 2007, a record 42 new studies were posted. Many of these studies are student research or have students as co-investigators.

## Online Student Research

Perhaps the greatest advantage of web-based research is that students can obtain a sample that is larger and more diverse than they would be able to obtain otherwise (Krantz & Dalal, 2000). By posting a link to their study on popular websites of online research (such as Hanover College's list), researchers can obtain responses from around the world. In addition, online research typically has lower participation costs than traditional research. Participants who might feel anxious traveling to a laboratory can participate from the comfort of their own computer. They can participate when it is convenient and save the time of traveling to a laboratory. Because of the low costs and the anonymity of participation, student researchers often feel comfortable soliciting participation from their friends and acquaintances, again boosting their sample size. Online research can also lower the costs for researchers. Materials that can be reproduced electronically, such as text and images, can be mass-produced for free in electronic form (assuming copyright permission has been obtained). The time required to enter data is nearly eliminated for online research because it is easy to store data in a comma-delimited format that can be imported into most statistical analysis programs.

An example of an online student research project is given at http://vault.hanover.edu/~altermattw/research/beatrix/index.html. In this study, the students hypothesized that a person's parents' marital status influenced ratings of their attractiveness as a

date or long-term relationship partner. On the informed consent page, participants select whether they will rate male or female faces. The link they click is generated by a JavaScript command embedded in the webpage that randomly assigns participants to one of two versions of those faces (You can see this and all JavaScript code by using the view source command). The faces that have divorced parents in one version have married parents in the other version. The photos were used with permission from Minear and Park (2004). The questionnaire submits not only the data that participants enter but also "hidden" data fields that indicate the version of the questionnaire and whether the faces are of males or females. The webpages for this study reside in the instructor's institutional web directory, permitting easy access, and the CGI program and data file are stored on the department's secure web server.

Although there are considerable advantages to student research on the web, there are costs as well. Foremost among these is the time and expertise required by instructors to assist in the development and testing of online studies. Even if students use the simple web study described above (three pages and a CGI program), the web form must be thoroughly tested to make sure the data are recorded correctly. This can be done by entering a sequence such as increasing and decreasing responses and then observing the logged data to see if the sequence was recorded correctly. Once that is complete, students should pilot test the survey on a few participants and the instructor may need to modify the questionnaire based on the feedback from those participants. Instructors considering online student research should, at a minimum, be familiar with the basics of html. Fraley (2004) provides a lucid and step-by-step guide to html for online research. The html code for a straightforward survey can be generated by students with little oversight using Birbaum's (2000) SurveyWiz webpage (http://psych.fullerton.edu/mbirnbaum/programs/surveyWiz.htm), but instructors must still modify the code produced by SurveyWiz so that data is transmitted to their home server. Other useful guidelines for developing online research are discussed by Reips (e.g., Reips, 2000). In general, expect to spend at least an hour developing and testing each online study. This time could be reduced by implementing tutorials for students focusing on 1) webpage formatting and layout and 2) how to upload new versions of pages and download the data file. These tutorials would speed up both the development and testing phases.

A pedagogical disadvantage of online research is that students are distanced from the process of data collection. The data appear as if by magic and students do not gain hands-on experience in administering a study. This distance increases if instructors shoulder most of the webpage design burden. Instructors should consider whether online studies should be students' only experience with research. Instructors should also consider whether they should permit a mix of traditional and online studies in the same class because of the potential imbalance in effort expended by the two types of data collection.

## Resources Needed

There are several online services that will handle much of the research setup and data collection for the researcher, but most of these have fees. One notable exception is QuestionPro (www.questionpro.com), which students can access for free to develop surveys with a variety of response options. See links at the bottom of Krantz (1995/2007) for a current list of several of the most popular services. For many reasons, researchers might want to either set up their own server or develop their own web pages. Most free online survey hosting services provide little flexibility, typically restricting researchers to Likert-type questionnaire items. One reason to develop one's own server is to keep control of the data. It is possible to have the data stored directly on the researcher's hard drive, limiting access by others to the data. The Apache (http://www.apache.org) server is the most popular server and has versions for many different types of operating systems. The resources needed for writing one's own web forms depend upon the project but at the minimum include access to a web server and a CGI script to collect the data. Nearly every academic institution has web servers and it is often possible to have the institutions' technology department grant researchers permission to post studies. They may even set up the CGI script necessary to collect data.

## Recruitment

There are many ways to recruit participants. If no special types of participants are needed, the best way to recruit is to post the study on a general list such as the ones listed in Table 1. If more specialized populations are desired, one of the best techniques is to contact discussion or email groups related to the population under interest. Many of these groups can be found via an internet search for the population of interest and seeing if a discussion group appears on the list. Yahoo also has an extensive set of discussion groups that can be searched. It is important to contact the list owner and ask permission to contact the list. If you do not get

permission from the list owner, your email will appear to be spam and at best ignored, at worst generating great negative feelings about psychological research which may prevent these people from participating in any research.

## Participant Motivation

The lack of direct control over the research situation raises a lot of concerns about whether the web can be used for psychological research. First, data collected over the web compares very favorably to data collected from the laboratory; in fact, the two data sets can often be indistinguishable (Krantz, Ballard & Scher, 1997; Krantz & Dalal, 2000). While the lack of the presence of the researcher in the room with the participant can lead to participants, perhaps, being less serious about their responses, the absence of the researcher also reduces the chance for demand characteristics playing a role in the data (Reips, 2000). Still, data collected suggest that online participants are as serious about participation as are laboratory participants (Krantz & Dalal, 2000; Reips, 2000). One issue that may bedevil a data set is multiple submissions, often the result of a delay in the response from the server and not any overt attempt to manipulate data by the participant. There are several ways to handle this issue, but perhaps the easiest is to design the web form to record the time and date of submission and the Internet protocol (IP) address, which identifies a computer (or set of computers) on the Internet. If there are several identical or nearly-identical entries in a short period of time from the same IP address, the researcher should consider eliminating the repetitions. It is not a common problem (Reips, 2000). See Reips (2000) for a more extensive discussion of these and other issues related to data quality and how to handle them on web research.

## Ethical Concerns

Ethical complications unique to online research are discussed elsewhere (see Birnbaum, 2001, pgs. 243-244; Fraley, 2004, pgs. 274-275; Reips, 2000), so only a few issues will be discussed here. Because it is generally not possible to verify that participants have received the debriefing, we recommend against online research involving deception. Another ethical concern with online studies is the ease with which copyrighted materials can be reproduced. Be sure to obtain permission from the copyright holder before displaying any copied media, including images. IP addresses collected to identify repeat responses cannot easily be associated with individuals, but this information should nevertheless be considered confidential, stored in a secure location, and destroyed when the study is complete. Finally, a commonly-overlooked obligation is the promise to share the results of a study with participants. An easy way to do this with online student research is to include a link in the debriefing page to a website where final copies of student papers will be posted. Online research also offers several ethical advantages over traditional research. Participants feel much freer to leave a study online than in the laboratory, suggesting that there is a lower risk of participants feeling pressured to continue. In addition, most online data collection is anonymous, reducing confidentiality concerns.

## Conclusion and Recommendations

Online research provides many advantages to the student researcher: sample size and diversity, inexpensive duplication of materials, and more efficient data entry are some of the most obvious. However, online research can be very time-consuming to develop and, if this is the student's only research experience, it can separate the student researcher from the research process in significant ways. Although there are some online services that make it easy to collect simple questionnaire data online, these tend to be inflexible and the resources necessary for developing flexible and personalized web forms are freely available at most educational institutions. It is probably an important exercise for a department to consider what role online student research should play in their overall curriculum.

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**Table 1**

***Web Sites Where Internet Studies Can be Advertised to Recruit Subjects***

| Site Name | Owner | Address |
|---|---|---|
| Psychological Research on the Net | John Krantz | http://psych.hanover.edu/research/exponnet.html |
| Social Psychology Network list of studies | Scott Plous | http://www.socialpsychology.org/expts.htm |
| The Web Experiment List | Ulf-Dietrich Reips | http://genpsylab-wexlist.unizh.ch/ |

# Environmental Psychological Research with Undergraduates in the National Parks

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I became fascinated with National Parks as a child while gazing at topographical maps and dreaming about what all those squiggly lines translated to experientially. My interest in the environmental psychology of National Parks developed when I was an undergraduate psychology major on a summer camping trip along the south rim of the Grand Canyon in Arizona. Coming from northern California, my girlfriend and I were not used to making reservations for camping, even in the national parks, except for places like Yosemite, of course. This was the first trip to the Grand Canyon for both of us and we were excited to confirm the idyllic images we had of this place in our mind.

As a result of our lack of planning, when arriving at the canyon we found the campground filled to capacity, leaving the options of camping outside of the park or getting a hotel room. We were here to camp and experience nature at her finest, so we opted to camp on National Forest land just south of the park boundary. As it was getting dark we pitched our tent in a beautiful forest, just a few miles from the rim of the Grand Canyon. Following a peaceful night of sleep, we awoke at sunrise to the sound of helicopters taking off from somewhere not too far away. A glance at the map confirmed there was an airport nearby, something we had neglected to notice the evening before. The noise was very loud, nearly continuous, and outside of our control, variables I would later realize were important predictors of annoyance. At the time I knew little about the measurement of loudness, audibility, natural quiet, or soundscapes, but the experience made me think. I wondered if this was normal, the status quo. During the remainder of our trip, we visited many points of interest along the south rim of the canyon, and were always struck by the sheer number of people at each stop. Clearly our expectations of what the Grand Canyon would be like and what it was actually like were completely different. We left Grand Canyon with many pleasant memories of wonderful adventures, but the noise encounters and feeling crowded were negative experiences that would not go away. These events did not reflect our expectations of the Grand Canyon. I have spent a good number of years following this trip learning how such expectations and experiences can be measured.

At the time the trip to Grand Canyon seemed so serendipitous, and yet I would later realize the experience foreshadowed many great things to come. When we returned to campus for classes in the fall, I was fortunate to have a senior seminar in environmental psychology, and I soon realized this was the discipline that had the tools necessary to address such questions as experiences and expectations in national parks and other natural areas. My fascination with this discipline has intensified, and to this day, 15 years later, I remain immersed in the study of environmental psychology, especially in the national parks.

## What is Environmental Psychology?

Many of the most basic environmental psychological research questions can trace their roots to the earliest psychologists, those who developed psychophysics. How do humans sense and perceive the physical world around them? How do we process light, sound, smell, and so on? During the first half of the 20$^{th}$ century, many psychologists recognized the importance of the physical environment to the development and control of behavior. By the 1960's environmental psychologists had formed their own discipline, with influence from social psychology, architecture, design, philosophy, and the environmental movement. What affordances does the physical environment offer? Do environmental attitudes predict behavior? How do we value and manage the commons? These questions hold particular significance to the environmental psychologist studying issues such as noise and air pollution in the national parks.

Environmental psychologists are interested in how humans affect the environment, and, in turn, how the environment affects human behavior. Often within the discipline the distinction is made between the natural and the built environment. Environmental

psychology is problem-oriented with researchers seeking resolution to a vexing real-world issue. Emphasis is often of a larger scale than most areas of psychology that tend to focus on the individual. Because of its focus, environmental psychology is interdisciplinary, allowing collaboration between researchers and students from seemingly disparate disciplines. Most importantly for those interested in researching in areas such as national parks, from its early stages environmental psychology has always valued applied and field based research (Bell, Greene, Fisher, & Baum, 2001).

## A Brief History of the Parks

Prior to the turn of the 20th century, Americans began to recognize the importance of preserving natural areas for future generations to experience and enjoy. To this end, a number of public parks were soon established on a local and national level. Today National parks are scenic wonders that draw millions of visitors each year throughout the United States. National parks are natural laboratories that are under utilized for their educational value, especially at the undergraduate level. Variables of interest may center on the sheer number of visitors (crowding, density), the design of trail or transportation systems, and the import of human caused pollution (haze, noise) into such pristine landscapes. These research areas are especially important when considering one of the primary reasons for visiting a national park, wilderness area, forest, or other outdoor recreational environment is to escape the stressors found in the built environment (e.g., Driver, 1996; Driver & Brown, 1983).

Positive affiliations with natural environments, including national parks, are also a major goal of environmental psychology research. Natural environments provide exquisite scenery and the opportunity to be immersed in nature, producing a calming effect. Ulrich et al. (1991) have demonstrated that following a stressful experience, the viewing of natural scenes increases positive feelings and reduces physiological indicators of stress (blood pressure, skin conductance, muscle tension), whereas viewing urban scenes does not. Attention Restoration Theory, as set forth by Kaplan and Kaplan (R. Kaplan & S. Kaplan, 1989; S. Kaplan, 1995) proposes that the restorative value of a nature experience is, in part, due to the soft fascination of natural scenes, which allows stress-depleted attentional capacities to be renewed. These are but a few of the theoretical bases that can be drawn upon to establish a set of research objectives. Environmental psychological research in national parks is also fluid in the sense that the research itself can help to identify areas for further study and aid directly in the theoretical development process.

## Obtaining Access

No matter what type of research is planned, the instructor or principal investigator should make the necessary contacts with personnel who work in the park several months ahead of the desired implementation date of the project. Often with environmental and social scientific research, the contact person in the park will be the resource manager. The resource manager may also have a list of research projects needed to be completed, some of which may be appropriate for a semester long undergraduate project, or an intensive summer research internship.

With careful planning and forethought, research in the national parks can be a straightforward and rewarding process. The depth of the project, amount of time, and what course requirements are to be satisfied will determine what type of research experience is possible. Formal research projects are often long-term, taking years rather than months to complete. In these cases, undergraduates may work on a piece of a broader research puzzle during the time they are involved.

One of the best ways of bringing environmental psychology alive is to become immersed in the environment itself. Over the years my colleagues and I have embraced this belief by teaming up and providing a three week intensive field study experience during the spring and summer in some of the most stunning and remote natural areas in the country. A group of 10-15 students and faculty focus on one or two research questions, with subsequent variations created by the inherent creativity that comes as a result of the experience. What is especially attractive about this approach is that undergraduates can be involved in every step of the research process. Emphasizing field based environmental psychological research in the national parks as a part of a course has led to several unique projects, a few of which will now be described.

## Successful Undergraduate Projects

The process of simply getting around a park can become the focus of numerous research projects, as my students and I have found over the past seven years while visiting Zion and Bryce Canyon National Parks. In the spring of 2000 in Zion, a mandatory shuttle transportation system was launched running through Zion canyon and the gateway community of Springdale, Utah. The shuttle is now required for all

visitors exploring Zion canyon during the months of April through October. Each double-length shuttle bus has the capacity to hold 66 people, replacing approximately 25 automobiles that would otherwise be competing for one of the 450 parking spaces in Zion canyon. On busy weekends prior to the shuttle, as many as 5000 cars would crowd into the main canyon hoping to be lucky enough to find one of the limited parking spaces. One of the main goals of the mandatory shuttle system, therefore, was to reduce crowding and traffic congestion and the associated effects on park resources.

As discussed above, undergraduates in a field class can be involved in every step of the research process. Students are excited to get to a park such as Zion and cannot wait to go exploring. This offers the immediate opportunity to engage their natural cognitive mapping abilities by completing wayfinding activities such as riding and sketching the routes of the shuttle system. This type of informal research helps to stimulate creativity and makes the research process an enjoyable experience with the added feeling of personal ownership. Of course, if one desires a more formal approach to the research process, this, too, is also an option. Additional research layers can then be added, such as formally analyzing visitor flow patterns or generating a visitor survey. Undergraduates have also developed research projects focusing on specific attributes of the shuttle (such as crowding, accessibility, efficiency, preference, and overall success) as well as park resources (such as scenic beauty, naturalness, freedom, and solitude). For example, during the inaugural season of the Zion shuttle, 191 visitors completed a 25-item survey at one of three shuttle stops. Follow-up data was collected in the spring and summer of 2003 from 202 visitors, and in 2005 a total of 520 visitors participated using the same survey instrument. Survey questions included Likert scales, checklists, and open-ended response opportunities. While visitors initially had a few reservations about the mandatory shuttle system during the first season of operation, by 2003 the vast majority were pleased with the shuttle and consider it very successful. All variables directly related to the shuttle system, except for crowding, significantly improved in 2003 compared to 2000. The largest differences between these two data sets were shuttle accessibility and efficiency. In 2005, visitors again reported a very positive experience. Differences were apparent between 2005 and the previous samples, however the visitor experience with the shuttle system continued to be positive. Multiple regression results indicate the success of the shuttle system from a visitors point of view is mediated primarily by preference, accessibility, and efficiency (Mace & Marquit, 2004; 2006).

Past undergraduate projects have also focused on the economic impact of the shuttle system on business owners in the gateway community of Springdale, which shares shuttle stops (and tourists) with the park. During the shuttle season of 2003, one particularly motivated undergraduate, Josh Marquit, took it upon himself to interview all of the business owners in Springdale who were affected by the shuttle. Fifty-nine local business owners and managers completed a 47-item survey assessing specific impacts of the shuttle system on the local businesses (including such changes involving parking, traffic, tourist flow, and sales). Results indicated that local businesses were generally satisfied with the shuttle system, although responses were not as positive as park visitors. Still, significant improvements in parking, traffic congestion, foot traffic, and sales were all attributed to the shuttle system (Marquit, Mace, & Roberts, 2004). This undergraduate research project shows the importance of collaboration between stakeholders, including those affected in the local gateway community. Josh is now working on completing his doctorate at Utah State University, where he continues to research a variety of pressing issues in environmental psychology.

Undergraduates have also completed research projects comparing the mandatory shuttle system in Zion National Park with the voluntary shuttle system in Bryce Canyon National Park. In 2004, during the fall season, 115 visitors completed a 23-item survey similar in design to those instruments used in Zion. Results found only 30% of Bryce Canyon visitors using the shuttle, even though 91% of all visitors knew the shuttle was implemented to help lessen noise, air pollution, and crowding. Those riding the shuttle were generally pleased with their experience, however the majority of visitors remain in their private vehicles when given the option (Riddle & Mace, 2005). Follow-up data was collected the next summer, in 2005, with 113 visitors completing the same shuttle survey. Rider ship was slightly higher than 2004, with 32% getting on the bus. Riders were generally pleased, however the majority of visitors continue to experience the park in their own vehicle, contrary to their stated attitudes (Riddle, Mace, & Cox, 2006). Voluntary shuttle systems are great examples of adaptive management in parks affected by crowding, yet they also fall victim to the attitude-behavior discrepancy often found in environmental and social psychology. In Bryce Canyon National Park, the shuttle was well received, but not well used. Managers at Bryce continue to explore ways to

increase the number of riders on the shuttle without making it mandatory.

Research opportunities examining transportation systems and the visitor response are not exclusively limited to the parks in southern Utah. National Parks such as Denali, Acadia, Yosemite, and Grand Canyon are but a few of the 50 parks in the national park system that have instituted and experimented with alternative transportation systems (Gallegos, 2005), offering research opportunities for undergraduates from coast to coast.

Crowding and transportation systems are not the only issues that can be researched by undergraduates in National Parks. Additional stressors commonly encountered in built environments are now affecting the national parks and their visitors. Traffic congestion continues to be one of the most harmful impacts visitors can have on the park. Idling cars emit high levels of particulates, affecting the natural resources and the overall air quality of the park. Particulates reduce visibility by creating a uniform haze that can blanket the entire landscape. Visibility impairment has been a focus of research in national parks for decades, having the effect of reducing the scope of scenic vistas while also bleaching out the colors of landscape features, creating a duller visual experience (Mace, Bell, & Loomis, 2004). Observational research with an emphasis on scaling and measurement are topics of particular interest when examining visibility and scenic beauty in the parks.

Visibility impairment can also be researched at night in parks that have programs dedicated to the exploration and interpretation of the night sky. Bryce Canyon National Park and Cedar Breaks National Monument have some of the darkest skies in the country, and the parks offers numerous interpretive and experiential programs related to the night sky. A visitor can engage in a ranger led program in the amphitheater, peer through telescopes into the depths of the universe during astronomy programs, or take a night hike with an interpretive guide. One student project in 2006 assessed the effectiveness of these night sky related programs on the visitor experience in these two parks. At Bryce Canyon alone, stargazing and astronomy programs are attended by over 28,000 visitors annually, essentially equaling the remainder of all other interpretive programs combined. During the summer and fall seasons, 1179 visitors to Bryce Canyon and Cedar Breaks took part in the study. Results found those visitors engaging in a ranger-led interpretive program on stargazing valued the night sky more than day users. In general, day users of the parks viewed the night sky as an opportunity to enjoy nature and to be alone, while after dark visitors perceived the night sky as an opportunity to better understand the universe and stimulate curiosity in science. Results also indicated the night sky and associated stargazing programs to be more important to the travel plans of Bryce Canyon visitors than Cedar Breaks visitors. In sum, the results show visitors to Bryce Canyon and Cedar Breaks have positive attitudes towards night sky visibility and the interpretive opportunities in the parks. Nearly all respondents (99.4%) identified a national park, a local park, or a wilderness area as a preferred location to stargaze. Visitors clearly value this important resource and benefit from the programs dedicated to light pollution and the interpretation of the cosmos (Mace & McDaniel, 2007).

Noise created by tourist activities and their motor vehicles are other areas of concern for park officials and environmental psychologists. In high density parking areas or transportation corridors, motor vehicle noise can completely block the sounds of wind, water, birds, and wildlife. Noise can intrude on the natural quiet, reduce feelings of solitude and tranquility, and increase feelings of annoyance and negative affect (Mace, Bell, & Loomis, 1999; 2003; 2004). High decibel noise has also been found to adversely affect local wildlife. Consequently, a number of research objectives can be centered around the soundscape of a park.

Attended audibility logging and on-site sound recording can be completed by undergraduates, focusing on a variety of metrics in the different acoustic zones of a given park. Current metrics that can be collected observationally with limited equipment include the source of the sound, the maximum decibels of a sound or noise event, the number of events, the length of noise free intervals, and time of day and seasonal audibility variations.

The perception of sound and noise is inherently psychological (it must be "unwanted" to be noise, but a sound may not be unwanted by all who hear it). Consequently, research on pleasant and unwanted sounds in natural areas requires more than reliance on just the physical parameters of sound, especially when considering the park service must take visitor related variables into consideration when developing management plans. Therefore, variables such as annoyance, acceptability and appropriateness, tranquility, serenity, naturalness, as well as a host of mediating and demographic variables can also be included when researching the soundscape of a park.

## Challenges and Obstacles

A number of challenges arise when completing environmental psychological research in the National Parks. Often these considerations are based on the

length and format of the course or planned research experience. For semester long courses with limited field research opportunities, an introductory level observational research experience will be the best option. Tracking and mapping visitor flow at popular viewpoints and using basic accretion and erosion techniques can provide a unique and rewarding research experience for those with a limited amount of time. Interpretive exhibits, placards, and displays afford the opportunity to examine existing signage and how information is communicated to visitors, including what is missing or confusing. Additionally, the physical design and construction of the visitor center or park museum may also serve as the unit of study, especially if there are notable green building practices. Observational research in the National Parks have the added benefit of not having to go through the extensive review processes of the National Park System and additional federal government agencies.

For those planning on spending a week or more in a park where visitor surveying is planned, approval must be gathered from a variety of personnel prior to surveying or interviewing. The resource manager of the park can provide the specific regulations required as they change from time to time. Once the resource manager approves the project, the survey will have to go through the National Park Service Social Science Review process and on to the Office of Management and Budget in Washington D.C. This process is detailed on the web at www.nature.nps.gov/ socialscience/. This can be a time consuming process, even with an expedited review. If a topic is deemed "controversial" a full review taking 8 months will be required. An intensive field experience in a gateway community adjacent to a park may also require approval from the local chamber of commerce or town manager. While the survey approval process can be cumbersome, it helps to protect the city, park, and researchers from liability, and will help establish relationships that could lead to fruitful projects in the future. Of course with any research that is to be formally undertaken, presented, and/or published, the proposal must also pass through the scrutiny of the university institutional review board.

Finally, despite all planning and preparation the natural world always has its own lessons to teach. While most of the time this provides a positive and incomparable experience, there are times when, as a student once said, things can get "sketchy" and "spin wildly out of control" in an instant. For example, we have found ourselves in the grip of a June snowstorm in Bryce, huddled in the tiny spot of shade provided by the lone tree on Toroweap Point as the temperature exceeded 110 degrees, assisting in the search and airlift rescue of a group (not ours) along the north rim of the Grand Canyon while studying the soundscape, and spending a few hours retrieving a stuck hiker literally wedged into a slot canyon in a remote area of the Grand Staircase. The basic lesson of such experiences is to plan and prepare, be overly prepared, and then prepare some more. It is important to go into the experience expecting the unexpected. Above all, do not panic (remember that other psychological skills can also come in quite handy during these unpredictable situations). Emphasizing safety from the very beginning helps to dispel the feeling that nature is one big amusement park. Things can and do go wrong out here, so it is always a must to have someone in the group who is a trained wilderness EMT.

## Conclusions

Providing a research experience for undergraduates in the national parks takes some planning and effort, however the rewards outweigh the hardships. Environmental psychological research experiences in the parks are best if they are designed with one or two objectives in mind, allowing students the creativity to move in many directions. Sometimes these follow-up research projects can turn into an internship or a grant with the supporting park. Many of these undergraduate driven research projects have been presented at local, regional, and international conferences, and submitted for publication in professional journals. These research experiences have the added benefits of helping with graduate school preparation and engaging in valuable service learning with the National Park Service and local gateway communities.

While this chapter has focused on environmental psychological research in national parks, it is important to point out there are many other local park or park-like settings surrounding most colleges and universities, which also provide a variety of research opportunities. State parks, reserves, forests, county, city, and even neighborhood parks offer opportunities for research, service learning, and educational enrichment. Getting outdoors is the key. Field experiences are powerful, producing moments of insight entirely dependent on immersion in the natural world. With some planning, creativity, and on-site exploration of local land areas, research questions easily come to mind.

The research partnerships formed between undergraduates, faculty, and park personnel has produced award-winning research while also creating additional opportunities for current and future students in the national parks. Beyond that, the experience itself has been personally and

professionally transformative, providing memories that will last a lifetime. More than any other teaching or research experience, those who engage in environmental field research in the national parks have found it to be one of the most educational and enjoyable experiences of their undergraduate career.

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# Practical Advice for Doing Research with Preschoolers

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The purpose of this chapter is to articulate some practical folk knowledge about doing research with preschoolers (roughly 2 to 5 years old) to help instructors supervise undergraduates who want to work with that age group. Essentially, this chapter will try to make the implicit explicit, even if that means stating the obvious in some cases.

## Securing a Sample

Local communities differ greatly in their accessibility to undergraduate research projects, so securing a sample of preschoolers can range from the simplicity of some phone calls to the complexity of months of delicate negotiations. Preschools and daycare centers are obvious places to start inquiring. Other groups that might provide research participants are "mothers' morning out" programs, public library story-time, and community parks-and-recreation programs. Neighborhood newspapers frequently list such programs, as might packages aimed at newcomers that realtors or civic organizations provide. With any of these established organizations, one needs to consider the following questions:

1. Is the sample representative of the population of interest? Full-time daycare centers cater to families where all adults in the household work or go to school full time; part-time care and preschools may cater to more economically advantaged families where at least one adult is not working full time; families that do not use out-of-home care may have different child-rearing philosophies than those who do use such care.

2. Does the facility have appropriate space for the research to be conducted there? If the sample is recruited from there but has to go elsewhere for the procedure, can the parents make time to do that?

3. Does the facility have policies about not leaving children alone with "strangers"? If so, how can the research protocol be adapted to accommodate that restriction?

4. Most schools and centers have policies against releasing children's names, addresses, and phone numbers. What will the facility permit so that researchers can contact parents to obtain consent? They might be willing to tuck notices into children's backpacks, post notices at the entry, let researchers "camp out" in the lobby to approach parents, or let researchers attend a parent-teacher meeting.

5. Is the facility a popular site for research recruitment, such that researchers need to worry about cross-contamination from other projects or low parental agreement rates because others have recently recruited participants?

Unlike public schools with their extensive bureaucracy and established procedures, most daycare centers and preschools are privately or independently operated and may not have any established policies about cooperating with requests for research. A simple, direct conversation with the director of the facility is usually sufficient for researchers to determine if that site will be a useful source. Once the director agrees, researchers should offer to have further conversations with any Board of Directors or parents' groups. If children are going to be leaving their classroom to participate, then researchers should also request a short meeting with the teachers to secure their cooperation. Consider carefully whether students have the social graces, if not political skills, to secure the necessary cooperation, or if the instructor should do this task.

A second method of securing a sample is through personal contacts. Instructors might know parents with an appropriately aged child or students might have babysitting contacts. A few cooperating parents can then supply contact information for others they know, who in turn widen the scope of possibilities. Such recruitment is haphazard, however. It can also be more time-consuming, and researchers are unlikely to know in advance what the demographics of the sample will be.

## Locating the Research Space

If daycare centers, preschools, or other facilities provide the sample, they may also be willing to permit the research to be conducted in their space. This shifts responsibility for travel from parents to researchers (which is usually a good tradeoff), and children are likely to be immediately comfortable in the location. However, facilities can be unpredictably noisy and interrupted by others entering the space.

The major problem, however, is controlling communication among the participants about the experience. Admonitions to keep the session a secret are not likely to be effective with young children. Teachers may resent the intrusions and interruptions that occur as children shuffle in and out of the classroom, so researchers need to be particularly mindful of the teachers' perspective and have direct conversations with them about ways to minimize the disruptions.

Conducting the research in the child's own home usually avoids the potential for contamination across participants and is the setting mostly likely to make the child feel comfortable, but it shares the probability for noise and physical interruptions. Researchers can feel like they are intruding on family life, and their unfamiliarity with the neighborhood can make locating each home difficult. There might also be concerns about researchers' safety in some locales.

If parents can bring their children to a laboratory room on campus, the researcher has more control over extraneous variables that can otherwise spoil an experimental trial, but counterbalancing that advantage are two potential drawbacks: parents forget to come and the children are likely to be uncomfortable or distressed in the unfamiliar surrounding. Researchers can, of course, call to remind parents of the appointment. In my setting, upwards of 10% of the parents will forget to come even after reminders, and the figure could be much higher in communities that are not college towns. Children should be given time to explore the laboratory setting, to raise their comfort level, but this extends the time that both researchers and parents must devote to the experience. Some children, perhaps 3-5%, will balk at the point of even entering the laboratory. If the research procedure allows it, parents might be able to sit in the experimental room to make their child more relaxed, but researchers then have to worry about parents influencing their child's responses or disciplining their child for perceived misbehavior or disappointing levels of performance. Sometimes children can be reassured that their parent is right outside the laboratory door, but if they are not reassured, I suggest letting the parent sit behind the child and making an explicit request for the parent to be nonreactive.

## Framing the Experience

If students have taken their research idea from existing literature, they may already have a sense of what form a suitable procedure might take, but published research is unlikely to make explicit some details that a novice child development researcher needs to know. For example, when researchers invite children to participate in the session, they usually try to make the activity seem like a game that will be fun, so students should avoid calling the session a *test* or an *experiment* (which vocabulary preschoolers will not understand anyway). I advise my students to tell parents that they are studying "child development" rather than "child psychology" to avoid any implication that something is wrong with their child that requires psychology to fix.

If students are modifying a procedure that worked with older children, they may need to simplify the instructions, reduce the number of stimuli or trials, raise the number of practice trials, change the content of stimuli to ensure that preschoolers are familiar with the items, add visual interest (e.g., add pictures to a verbal story) or make the event more dramatic, break up a long procedure into shorter sessions, and insert memory or comprehension probes.

## Establishing a Good First Impression

Traditional-age college students, who are used to their own parents' and teachers' familiarity with and understanding of collegiate behavior, need to be reminded that parents of preschoolers and the children themselves will likely expect students to behave as confident, friendly, and competent adults. That is, students may need to learn to fake it. Students should greet the parent (or teacher) first and perhaps spend a few minutes chatting with the adult before attempting to greet the child. Using a warm, friendly voice, smiling, and getting down to the child's eye level are usually helpful in establishing rapport, as is explicitly telling the child the researcher's own name. A positive remark, such as how happy the student is that the child is present or commenting on something the child is holding or wearing, can break the ice. Simple questions about favorite television characters or games can also serve this function. Warm-up activities can not only put the child at ease but also might help communicate the nature of the experimental task.

Preschoolers are not likely to pay much attention to what student researchers are wearing, but the adults who make the children available certainly do. I recommend that students be told to avoid wearing "grubby" clothes – no holes in their jeans, no bellybutton rings showing, no T-shirts (especially those with offensive slogans) – but they do not need to be as formally attired as they would for a job interview.

## Coping with Preschoolers' Behavior

Children vary widely in their understanding of proper behavior in a research setting and in their willingness to cooperate with a stranger's (the experimenter's) requests. I strongly recommend that instructors use class time to demonstrate possible child behaviors and have their students formulate and practice plans for coping with each type of child:

1. The nonreactive, silent participant. Some children will react to the experimental session by freezing or withdrawing into passive silence. Student researchers should know in advance how long they should wait for a response, what level of coaxing to employ, and when to just terminate the session.

2. The physically overactive child. Some children want to touch, pick up, or fiddle with anything that is not bolted down, and some will fiddle with the bolts! Researchers must decide whether they can ignore those behaviors or must ask the child to stop. Can they arrange stimuli to be out of reach but still suitably visible? Can the child be given some task to perform (e.g., turning the pages of a booklet that accompanies a story or pressing a computer key to initiate a trial) that will prevent other actions from disrupting the procedure? A second way that preschoolers are physically active is literally by not sitting still. I have had children repetitively kick the underside of a table, get out of their chair to wander around the room, belly-flop on the table, crawl under the table, tip back in their chairs to the point of nearly falling over, or just prefer standing to sitting. Again, can these movements be tolerated or do they interfere with the child's attention to the task?

3. The verbally active child. It is very common for some preschoolers to want to tell stories or engage in lengthy conversations. For example, after listening to one of the researcher's stories, the child may insist on telling a story in return. If the procedure requires that children provide an explanation or elaboration of their answers, children may use that as a springboard for extensive monologues. It is difficult to know when to cut off such verbalizations without introducing experimenter bias. Children may not ask questions at the start of the procedure (when the researcher invited them to do so), but they may interrupt later as questions occur to them. These may be on-task, such as asking how much longer the procedure will last or whether their parent will be informed of their behavior, or off-task, such as asking why the room walls are painted blue, whether the "bogey-man" is watching from behind the one-way mirror, or whether the experimenter can come home with them to play more.

4. The silly child. There are no end of ways that children can be silly and surprising, but common ones are exaggerating movements (e.g., big arm sweeps prior to pointing to their response choice) or speaking styles (e.g., saying *Noooooo* instead of *No*) or tossing instead of handing objects to the experimenter. If the researcher reacts with too much amusement, the child may prolong or escalate the silliness. The most startling action that one of my students reported occurred as the student was focused on discussing the informed consent form with the parent. The child had come in a Halloween costume, and when the student turned her attention back to the child, she found the little girl had stripped down to her underwear.

## Safety and Health Concerns

Students need to be reminded about making the environment physically safe for preschoolers, such as no small toy parts that can be choking hazards and no sharp edges to furniture or toys. One often-overlooked area of safety concerns cleanliness. Preschoolers may be less likely than babies to mouth toys, but they are still quite likely to suck on their own fingers and then touch the stimulus materials and furniture in the research room. They rarely cover their mouths when they cough or sneeze or have tissues available for wiping their noses. One can laminate or use plastic protective covers over stimuli so that they can be wiped clean between participant sessions. (Incidentally, this also protects the material from being damaged.) Researchers should ask children if they want to use the toilet before the session begins and be prepared for children to decline at first but ask to go after the session has begun. Although it may be tempting to ask the child to wait if the session is nearly over, I do not recommend that. Even if the child can physically wait without an accident, the mental distraction of trying to wait may be enough to disrupt task performance.

Many children find it difficult to exercise their right to withdraw from an experiment both because they do not understand (despite direct instruction) that they have that right and because they are taught to be obedient to those in apparent authority. Moreover, researchers have to exercise a delicate balance between implanting the suggestion that a child might find the procedure boring or discomforting when the child would not otherwise think so and overcoming the child's reluctance to stop when the child truly wants to. Instructors should coach students in looking for nonverbal cues that children want to stop and program explicit offers to stop during the procedure (e.g., "I have another game to play, if you want to continue.").

## Practice, Practice, Practice

There is no substitute for experience, so the final piece of advice I can offer is to provide students with as much exposure to preschoolers as they can schedule before running participants. If students are not used to talking with preschoolers, they will not necessarily know how to converse or how to elicit responses without making the child feel interrogated. Students might volunteer for a few hours at a preschool or daycare facility, where their interactions will be supervised and where they can observe how the adults interact with children. They can be a play companion for a child in a cooperating family when one parent is in the home but welcomes having the child kept busy. Instructors might show videotapes of actual or simulated research sessions to give students models of how to engage children of that age. Even the act of reading instructions needs to be practiced so that the pace of reading is slow enough for children to process and so the researcher can maintain more eye contact than they would with older participants. Tell them to prepare for the worst, hope for the best, and when all else fails, call for parental backup.

# Teaching Qualitative Research to Undergraduate Students

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Often, undergraduates ask sophisticated questions without having the language or methodological knowledge to really explore the questions most important to them. Equipping undergraduates with knowledge of constructivist world views, and qualitative methods can help those students, whose questions may be exploratory in nature, seeking to understand how we construct the world around us. A crucial component of a good researcher is the spark that happens when passion meets scholarship. We often encounter undergraduates who are passionate about qualitative inquiry. The goal of this chapter is to provide a first step for instructors in psychology to incorporate qualitative design and method into their curriculum.

On the first day of a Research Methods class, before any material is presented on research design or hypotheses, we asked students to write down a research question of interest. Some example questions include: How do parents deal with autistic children? Why do men and women think differently about sex? Another student spoke up reporting she wanted to ask 'what is the meaning of life,' but thought you couldn't test that. And, my favorite one: Why do we work so hard before we die? As this was a Quantitative Research Methods and Statistics course, these were all qualitative questions that needed to be reworked into testable empirical hypotheses. But, throughout the course I found myself returning to their original qualitative questions.

Conducting qualitative research with undergraduates requires instructors to not only teach the methods involved, but place the methods within a framework, often in contrast with quantitative research. Introducing the method is an obvious place to begin. Should this be done like one would introduce an acquaintance, a friend, or a stranger; each calling for a different level of familiarity, language and length? We advocate for introducing qualitative work with undergraduates with the familiarity of an acquaintance for two primary reasons: First, it is a method of inquiry not entirely unlike the scientific method and empirical methods that most undergraduates are required to take. Familiarity already exists. Unlike an ANOVA or a regression analysis, students have an intuitive sense of the utility of an interview, or an observation. Second, qualitative methodology and the constructivist worldview that accompanies it feel, to some students, like a warm blanket in a Nebraska winter. Face it; qualitative researchers are sometimes different from quantitative researchers, in temperament, in worldview, in marked ways. Students disclose that they feel like they were meant to do this kind of work (Glesne, 1999). We often use Denzin and Lincoln's (2000) definition of qualitative research to begin the discussion.

> Qualitative research is multi-method in focus, involving an interpretive naturalistic approach to its subject matter. This means that qualitative researchers study things in their natural setting, attempting to make sense of and interpret phenomena in terms of the meanings people bring to them. Qualitative research involves the studies use and collection of a variety of empirical materials—case study, personal experience, introspective, life story, interview, observational, historical, interactional, and visual texts—that describe routine and problematic moments and meaning in individuals' lives. (p. 2).

Creswell (1998) uses much of this definition, but adds the goal of creating a 'complex, holistic picture' of the phenomena.

But how do qualitative methods fit into the scientific method that our undergraduates have been taught since grade school? Introducing worldviews and knowledge claims has served as a valuable tool that grounds students by bringing research methodology to them as a choice that can be made based on a larger belief system about the people or events, or phenomena in which they are interested in. Most research methods taught at most universities follows positivist knowledge claims. This position has been referred to as the 'scientific method' but it

also covers quantitative research, empirical science, and postpositivism (Creswell, 2003).

Constructivists, on the other hand, use another set of assumptions about knowledge. Crotty (1998) identified several assumptions in constructivist research. First, meaning is constructed by human beings as they engage with the world they are interpreting. Second, we engage with the world and make sense of it based on our historical and social perspectives. Qualitative researchers, thus, seek to understand the context or setting of the participants. Third, meaning is always social and arises out of interaction with a human community. The process of qualitative research is, by in large, inductive, with the researcher generating meaning from the data collected in the field. By introducing ways of knowing and constructivism, students are prepared then to move on to methodology. Table 1 shows both post positivist and constructivist knowledge claims.

**Table 1**

***Worldviews and knowledge claims***

| **Postpositivism** | **Constructivism** |
|---|---|
| Determinism | Understanding |
| Reductionism | Multiple participant meanings |
| Empirical observation | Social and historical construction |
| Measurement | Theory generation |
| Theory verification | |

*Adapted from Creswell (2003) Research Design. Sage: Thousand Oaks, CA. p. 6.*

Historically, research outlines qualitative methodology in Sociology (Strauss & Corbin, 1998), Geography (Ley, 1992; Pile, 1992), Education and Educational Psychology (Creswell, 2003; Lancy, 1993), and Anthropology (Bernal, 2002; Wolcott, 1999). On the whole, Psychology has been slower to warm up to qualitative methods. Phenomenological research may be the one exception (Moustakas, 1994). Top psychology journals like Developmental Psychology; have only in the last few years opened their journals to mixed methodology that includes qualitative components. Disciplines that are more exclusively qualitative (e.g. anthropology) have a rich literature on methodology (see Bernal, 2002 for review).

Although the literature on teaching qualitative methodology in psychology is sparse, the handful of published accounts addressing the subject provide valuable insights to teachers interested in either incorporating qualitative approaches into their current research methods coursework or in implementing new courses dedicated solely to qualitative methods. A common theme in the literature is the emphasis on moving qualitative coursework out of the classroom and into the community where students are given the unique opportunity to learn by doing (Pile, 1992; Rippetoe, 1977; Schmid, 1992). Although there is near consensus on the value of field-based projects (see Ley, 1992), there are varying opinions as to the appropriate scale for such projects.

## Qualitative Research in Practice

Most field-based courses employ group projects as semester-long individual projects are seen as too challenging and unrealistic be successful in the context of an undergraduate course (Nyden, 1991), but may be an effective way to teach specific qualitative skills such as oral-history interviewing (Pile, 1992). Teachers employing the group project format in their qualitative courses have at times used small groups consisting of several students (Steckler et al., 2001), large or whole-class groups (Gondolf, 1980; Keen, 1996; Nyden, 1991; Takata & Leiting, 1987), or whole-class groups in the context of an ongoing project (Schmid, 1992). Whereas all of the examples cited here have been successful both in the views of instructors and students, there are trade-offs based on group size that prospective teachers must consider when designing their own course. As group size increases, it becomes increasingly difficult to assign grades and cater to the specific interests of students, but at the same time, larger groups allow for more streamlined navigation though project design and implementation and also contributing to a more efficient use of class time as all students are engaged in the same research questions. In addition to the practical benefits of whole-class groups, there remains the possibility that with proper guidance and hard work the research project could result in publication even in the context of an undergraduate course (for example see Nyden, 1991).

The literature on teaching qualitative research also includes suggestions for in-class exercises that would be used either in place of or in addition to field-based learning. Hood (2006) gives examples of assignments and discussion questions what she has used in past qualitative methods courses. She begins her classes by challenging the folk knowledge that words are less precise than numbers and interpretations of qualitative data are more subjective than the interpretations of quantitative data. She transitions into discussions about bias, making bias explicit rather than assuming qualitative researchers

are bias free. She then asks students to identify and write about their own biases in regards to their chosen topic. Talley and Timmer (1992) use teacher evaluation forms to launch a discussion of subjective meaning and the social construction of reality as a way to introduce qualitative methods to their students. Pile (1992) has his students practice mock oral history interviews before going into the field to conduct their own research projects, and dedicates class time to discussing different writing styles and note-taking techniques. The examples of these authors should assist new teachers of qualitative methods in designing their own courses and assisting their students' growth as competent researchers.

Scholars of qualitative research identify different methods of qualitative inquiry (Lancey, 1993; Creswell, 1998). Whereas most agree on around five to seven methods, we prefer using the following five methods: 1) A case study is a study that is bound in space and time and can be a single case or multiple cases. This process sets out to define the case, identify themes and then make interpretive assertions (Stake, 1995). Robert Stake's *The Art of Case Study* is a manageable text for undergraduates. 2) Phenomenology is the study of the human lived experience and is based on the philosophical assumptions of Edmund Husserl (1859-1938). We recommend Moustakas's (1994) method of phenomenology. Methodologically, it looks for significant statements then moves to textual and structural descriptions, ending with the essence of the experience. 3) Life History Interviews have evolved from oral history and ethnographic methods and gathers information on the subjective essence of a person's entire life. We recommend Robert Atkinson's book, *The Life Story Interview* (1998). 4) Grounded theory research aims to generate or discover a theory through inductive means. Researchers typically interview until they reach saturation (no longer finding information that adds to the study). Strauss & Corbin (1998) have written the definitive book on grounded theory. 5) Finally, ethnography is the study and interpretation of a cultural or social group or system. It is characterized by prolonged time in the field and participant observation, among other techniques. Many good anthropological texts exist and offer different techniques. We like the work of Wolcott (1999), an educational anthropologist.

Throughout the semester of teaching empirical methods we asked the students to reshape their initial questions into testable quantitative hypotheses. They consistently have successfully met this requirement. We question whether a strong empirical background carefully whittles down our research questions into small branches until the beauty and grandeur of the tree is lost. Teaching methods from a constructivist or pragmatic viewpoint helps these students retain their sense of the tree as a tree. We believe successful undergraduate education can provide students' opportunities to articulate their worldview and develop and hone research skills that reflect their deepest questions.

## Challenges to Teaching Qualitative Methods

There are practical difficulties to teaching qualitative methods. First of all, the time commitment involved in planning, conducting, analyzing and writing up a qualitative study is substantial and often times outside the restrictions of a semester class. Conducting a whole-class group projects might make it possible to end the semester with a finished product. Whether you choose a whole-class or individual project, if the manuscript will be submitted for publication then IRB approval is required. We have experiences where a quarter of the class had to take an incomplete because their IRB was not approved until late in the semester. Not requiring IRB is an option. Another option is as the instructor you can submit an IRB prior to the start of class. Some institutions will allow for blanket IRB for small class projects. It is always best to check with your institution's IRB regarding projects that might fall in between research to be disseminated and class projects. Grading individual qualitative assignments and manuscripts can also be time consuming and beyond the capabilities of busy instructors.

## Conclusion

Norman Cousins (1982) said "ultimately, it is the physician's respect for the human soul that determines the worth of his science." (p. 589). We can easily replace physicians with researchers and more easily understand that the complex holistic picture that qualitative research adds to our psychological understanding can be done with respect for our most human side. We hope to use this insight when proposing, educating, and shaping the next generation of psychological researchers.

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# Conducting Archival Research on the History of Psychology

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Undergraduate psychology students need not be enrolled in a history of psychology course in order to use primary sources. Primary sources such as original research data and publications are important when conducting varying types of undergraduate research such as an empirical research study or a literature review. Reviewing original data and rough drafts of results intended for publication can be useful to undergraduates when initially developing an empirical study. Correspondence and memorandums of a colleague's review of a psychologist's research can help students to understand the strengths and weaknesses of past research in addition to learning what the original researcher may have altered within the study that produced his or her final results.

When conducting a literature review or a historical analysis it is crucial that students do not rely solely on textbooks and other secondary sources. Secondary sources are often described as interpretive or narrative sources for good reason—it is the author's interpretation of the original source (Eicher, 2007). In reviewing the primary sources for themselves, undergraduate students can make their own interpretations, some of which may differ from published secondary sources.

## The Importance of Primary Source Material

There appear to be two recurring themes in the literature (the teaching of psychology literature, the teaching of history literature, and the library and information science literature) regarding the use of primary sources in teaching history. Psychologists, historians, librarians and archivists all agree on the importance of critical thinking in the undergraduate classroom and all believe that primary source material can be a supreme catalyst in generating critical thinking skills. Unfortunately, many of those people also agree that a majority of undergraduate students do not know what primary sources are or how to interpret them. Thus the job is two-fold for the instructor who wishes to use primary sources in her or his classroom—they must first teach students what primary sources are and how they can be used in historical research before introducing archival material into the curriculum (Kunkel, Weaver, and Cook, 1996; Matyn, 2000; Allen, 1999; Eicher, 2007; and Sutton & Knight, 2006).

According to Baker (2002) there are two central maxims in historical scholarship within the "new history": (1) the consideration of context and (2) the use of primary source materials. These maxims work together as primary sources often provide a sense of historical context. Historical research involves the identification of sources as well as the selection of evidence from those sources. It is important to ask students what is it about the source (whether it is a letter, a diary, a film, or a photograph) that supplies evidence and how does that evidence and the primary source in general fit within the greater historical context? Students must think about the social and political atmosphere of the time when considering what can be viewed as evidence within a primary source document. Using critical thinking skills to determine why and how a certain source provides the evidence it does is central to historical research, regardless of subject matter.

It is also important that students understand that the historical record is not infallible. Primary source materials vary widely not only in their format but also in the usefulness of the evidence they provide. Instructors should remind students to take into account the possibility of such factors as human error, carelessness and even dishonesty within the historical record. Discrepancies provide an opportunity for students to sort out the facts by judging the credibility of a number of sources on the same topic. Sutton and Knight (2006) claim that students who use primary source material in the course of their research often begin to "see themselves as stewards of their own learning." Through a critical analysis of primary and secondary source material students begin to understand how secondary sources are created and general knowledge is obtained. These are skills that students can take with them to any number of college classes and apply to information resources in all areas of their lives.

While working as a teaching assistant for the undergraduate history of psychology course at The University of Akron I was able to assist in the creation of several projects that allowed students to use primary source material. Students enrolled in the history of psychology course at The University of Akron have an immense advantage as they can physically access material maintained at the Archives of the History of American Psychology (AHAP) located on the university's campus. However, the same issues arose in this class that occur in many classrooms—a significant number of students were unfamiliar with archival material and many did not understand how to interpret the evidence discovered within the resources.

In many cases students enrolled in history of psychology courses are psychology majors who do not make historical research a priority. The history class is often an elective and some students may have never taken a history class beyond the university's required core courses. The history of psychology instructor has the opportunity to teach students more than just the history of psychology. Instructors can teach students how to conduct historical research, how to understand primary sources and interpret their evidence and how to use critical thinking skills to answer questions and generate their own opinions and judgments in areas of controversy.

However, primary sources need not be used solely in the history classroom. Students are required to conduct research and write research papers in nearly all of their psychology classes and primary sources can play a role across a student's curriculum. Often the first source a student turns to is the course textbook. Although textbooks are often good references as they are an interpretation of primary sources they are not infallible. Students should look for specific primary source citation within the textbook and make an attempt to review those sources for themselves.

An excellent example of misinterpretation within a psychology textbook can be found in an article regarding John B. Watson's alleged sex research at Johns Hopkins University (Benjamin, Whitaker, Ramsey, & Zeve, 2007). Psychologist James V. McConnell, unsatisfied that the sole reason of Watson's forced resignation from Johns Hopkins was his affair with one his graduate students (Rosalie Rayner), sought to discover if there was an additional reason for Watson's departure.

In the 1950s McConnell met and spoke with a colleague of Watson's in the advertising business who informed McConnell that Watson had told him he conducted research during sexual intercourse using himself and Rayner as subjects. McConnell eventually took this statement as fact and included it in his introductory psychology textbook, *Understanding Human Behavior: An Introduction to Psychology*, without any citation whatsoever. Several other history and introduction textbooks included the story as well (Benjamin, et al identified six different textbooks that included the story) citing only McConnell's textbook as their evidence. Scholars and biographers of Watson could not find evidence to back the claim and when they asked McConnell for his source he simply retold the story that he heard from Watson's colleague. Although McConnell continued to publish the story throughout the life of his introductory textbook, eventually other authors dropped the story when they realized that it was likely just that—a story.

The problem here is that it is quite possible that at some point in time an undergraduate may have cited the textbook and Watson's alleged sex experiments in a research paper without questioning its authenticity. However, had the student conducted a literature review of Watson's actual published work and sought out other primary sources they would have discovered little, if any, evidence behind the story. Primary sources and secondary sources reveal the most when used in a complementary fashion rather than simply relying on one or the other as both can present problems to researchers (Stewart and Kamins, 1993).

Digitization of archival material opens many new avenues of learning. Although progress is being made, and more and more archives are putting digital content on their websites, it is still a slow and arduous process. Beyond the time and monetary resources involved in digitization efforts there are numerous copyright issues that surround archival material. AHAP and other archives are often more than happy to collaborate with instructors in creating assignments and providing photocopied or digitally scanned primary source material as long as ample time is provided, instructors do most of the background research, and requests are not overly demanding.

## Using Primary Source Material in the Classroom

To familiarize students with primary source material numerous examples were taken to the classroom from the archives. Encapsulated correspondence, memoranda, photographs, and various other archival materials were presented to the students in class. The students were able to handle the material and gain a general understanding of what constitutes archives and special collections. This is truly the first step in getting students to understand

the usefulness and value of primary source material. Students were often asked to work in groups to interpret sources and present their interpretations to the class. Specific questions were asked of the students so that their analysis remained focused and concise.

## Examples of Primary Sources in the Classroom

The Walter Miles Papers include a series of correspondence between psychologists Walter Miles and Helen Bradford Thompson Woolley shortly after her dismissal from Teacher's College at Columbia University. Over the course of several letters Woolley explains her plight to Miles and seeks advice for her future. Seven different letters from the series were encased in a protective Mylar sleeve, a technique known as encapsulation, and students were asked to form seven small groups in order to review the correspondence and answer several questions that were provided to them (see Appendix A for questions). Students had interesting ideas concerning Miles' and Woolley's relationship and a class discussion followed the exercise. Later all of the letters were scanned and made available to the students digitally on WebCT so that they could review the entire string of correspondence and determine the accuracy of their interpretations and assumptions.

Students read about and are exposed to numerous interpretations of original research far removed from the original researchers and their interpretations. A classic example is the 1920 "Little Albert" study conducted by John B. Watson and Rosalie Rayner. Watson and Rayner's original publication, *Conditioned Emotional Reactions,* is a primary source. Holding a class discussion about "Little Albert" and asking students what they have been taught about the study is an excellent opportunity to determine what students actually know about the classic experiment.

Asking students to read the original 1920 publication and use their critical thinking skills to establish differences in what they have been taught and what actually happened provides an opportunity for students to become conscious of the fact that history is interpreted differently by different historians. A variation of this would be to provide students with secondary sources written about Watson's and Rayner's work and have them interpret those sources as well. Numerous seminal works in the history of psychology are available in full-text on a website maintained by Christopher Green of York University, "Classics in the History of Psychology" (http://psychclassics.yorku.ca/index.htm)

At The University of Akron students are assigned to write a short, ten-page biography on a psychologist. Some of the students were lucky enough to choose or be assigned psychologists whose papers are maintained at AHAP. When I began working as a teaching assistant in 2006 I offered to help the students conduct research in the archives. I learned very quickly what has been reported in the literature—most students did not understand how to use finding aids in order to locate material pertinent to their research and many seemed afraid to ask questions. It is often more important to spend time locating relevant material and providing it to the students so they can use and interpret it rather than having them spend their time sifting through finding aids and attempting to determine what will be useful. This is especially true for novice researchers. It may take more time on the instructor's part but is much more valuable to students.

For the spring 2007 course a group project was created in which students were required to conduct research in the archives and include primary source evidence in their final project. Topics for the projects were created in advance and students were asked to sign up for the topic that interested them most. The topics included, "What was it like to be a student of Wilhelm Wundt's"; "Pioneering women in functional psychology"; "The history of eugenics and family planning in psychology"; The history of behavioral technology"; "The history of the founding of the Association of Black Psychology"; and "The history of directive and non-directive counseling techniques."

It was up to the group members to delegate tasks and develop a creative presentation for the class in addition to writing a short five-page paper using a minimum of one primary source and four secondary sources. Private discussion boards were set up in WebCT to help facilitate conversation amongst group members. When group members came to the archives they were provided with a list of materials within the collection that were related to their project. They were also provided with several examples of secondary sources. Determining relevant material and noting its location within AHAP's collection was done well in advance of the students' arrival in the archives. Providing examples of primary and secondary sources allows students to spend more time finding the evidence they are looking for as well as critically analyzing and comparing it to other published sources.

For example, the group attempting to discover what life was like for students in Leipzig under Wilhelm Wundt was provided with the journals and

notebooks of two students who worked with Wundt in some capacity—psychologists Foster P. Boswell and Raymond Dodge. Reading handwritten notes can be a difficult and time-consuming task, so having the journals already available for students to view allowed them to spend more time researching rather than trying to determine what material from the larger Boswell and Dodge Collections would be of use. Students were also able to use a secondary source from the AHAP's library, Ludy T. Benjamin's *A History of Psychology in Letters* which includes a chapter of reproductions of letters that psychologist James McKeen Cattell wrote home to his parents while he studied in Leipzig with Wundt. (Benjamin, 2006). In analyzing these three very different sources students were able to look for similarities and differences amongst the experiences of the three American psychologists during their time in Leipzig.

## Conclusion

Finding primary source material to use in an undergraduate history of psychology course is becoming easier. Both Division 26 of the American Psychological Association (APA) and Cheiron: The International Society for the History of Behavioral and Social Sciences provide links to archives and archival material on their websites. More and more archives are posting finding aids on their websites and most are more than willing to help professors and instructors in locating primary source material that can be used in the classroom. However, instructors in the history of psychology must be prepared to conduct their own research and ask their own questions in order to locate archival material that will fit within their curriculum.

Students and instructors must remember that primary source documents do indeed have a place outside of the history of psychology classroom. Reviewing primary sources in the course of other psychological research can provide a foundation and a context for current research trends. The proliferation of primary source materials on college campuses in archives and libraries as well as those available on the internet provide students with ample opportunities to interpret history for themselves.

Sutton and Knight (2006) encourage instructors to share with students their own historical research in order for students to better understand the relationship between primary and secondary source material. The "testimonial" can be a powerful tool in inspiring students to get excited about the archival material that provides the evidence for what is being taught as the history of psychology. The introduction of primary source material into the classroom alone is not enough to get students genuinely interested in the history of psychology. Instead instructors must find a balance, and even more importantly, teach students the history of psychology with enthusiasm and accuracy. "If you as a teacher convey to your students an excitement for the material you are presenting, then many of them will catch the enthusiasm, and few, if any, will be disappointed with the course" (Benjamin, 1979, p. 15).

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## **Appendix A**.

History & Systems of Psychology
Spring 2007

In-class Archival Exercise
(Material taken from the Walter R. Miles Papers)

(1.) What is the date of the letter? Who is the sender? Who received the letter?

(2.) What is the main point of the letter? What is the author trying to convey to the receiver?

(3.) Can you tell why the author wrote the letter? Does it appear to be personal or professional correspondence?

(4.) Can you relate any of the ideas expressed within the letter to anything we have discussed in class or anything you have read for class?

(5.) How does this correspondence fit within the larger context of the role of women in psychology during this time period? How could a historian use this letter as evidence?

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# Section 5. Faculty and Student Roles

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# Bending Twigs: The Act of Mentoring Undergraduate Student Research

**Theresa A. Wadkins & Richard L. Miller**

***University of Nebraska at Kearney***

According to Blanford (2000), mentoring is a process in which tacit knowledge is transmitted from those who know to those who need to know. When mentoring undergraduate research, the primary mission is the process of training students to conduct research rather than merely answering the researchable question. In other words, the mentor may not be at all interested in adding to the literature or knowledge base of a topic, but may simply replicate studies in order to teach students the research methodology. While mentors provide supervision of a research project, and in many cases, collaboration on the project, mentors also provide a model of what it means to be a researcher. Mentors guide students, but more importantly encourage students to explore and figure out some of the process for themselves. This can include allowing students to make mistakes, which can provide a valuable lesson as well. Lanza (1988) describes mentoring undergraduate research as a "fine blend of direction and freedom". She suggests that mistakes, while frustrating and sometimes time wasting, can be more instructive than constant supervision that doesn't allow the student to develop problem solving and decision making skills.

Another unique perspective on mentoring is described by Koro-Ljungberg and Hayes (2006) who suggest that mentors are transformers: they facilitate the student's transformation from novice to researcher. Mentoring is described as a process that leads to the development of the students' research skills and, in essence, transforms their professional and academic selves.

Research on mentoring in academia has examined what characteristics make a good mentor (Appleby, 1999), the process of mentoring (Kram, 1986), the roles that mentors should play (Jpson & Paley, 2000) and different styles of mentoring (Stahlhut & Hawkes, 1990).

## Important Mentor Characteristics

In a study of 212 student teachers, Stahlhut and Hawkes (1990) identified four styles of mentoring used by supervising teachers: Supporting, coaching, delegating, and directing. The supporting style uses praise to promote cooperation, consideration and minimization of conflict. It is more relationship-oriented than task-oriented. The coaching style involves modeling and demonstrating appropriate behaviors. It includes integration, persuasiveness, and active assumption of the mentor role. The delegating style places greater responsibility on the protégé and tolerates greater ambiguity and freedom of choice. The directing style involves telling protégés what, how and when to do things. It places the emphasis on task completion and performance outcomes. Stahlhut and Hawkes (1990) found that mentors who adopted a supporting or delegating style positively influenced their protégé's success in the classroom. The coaching style showed no significant relationship to success while the directing style had a negative influence on success as a student teacher. Flexibility in mentoring styles was found to be important allowing the style to be tailored to the needs of different protégés.

Although flexibility when tailoring styles to students' needs is important in successful mentoring, three categories of attributes characterize a good mentor regardless of style (Appleby, 1999): interpersonal skills, personal attributes, and professional competencies. The interpersonal skills of a good mentor involve caring and encouraging, promoting and sponsoring, supporting and protecting, as well as challenging and demanding. The personal attributes of a good mentor include being mature and wise, friendly and optimistic, admired and respected, as well as trustworthy and dependable. Finally, good mentors should be professionally competent, which includes being qualified, experienced and seasoned, knowledgeable and informative, as well as professionally involved and active. Obviously mentors differ in the extent to which they exhibit these various qualities and Appleby suggests that students should conduct a critical self-appraisal to determine their specific needs (e.g., amount of direction; needed skills) and career objectives when choosing a mentor that will be most helpful to them. An initial meeting between mentor and student is a good opportunity to explore mutual interests, establish rapport, and ground rules for the

relationship, including availability, communication style, and expectations of the relationship.

Cronan-Hillix, Gensheimer, Cronan-Hillix, and Davidson (1986) conducted research on students' perceptions of what makes a person a good mentor. Students' descriptions of a good mentor were similar to those of Appleby. Students indicated that good mentors were interested and supportive, knowledgeable and competent and possessed positive personality characteristics including a sense of humor, compassion, dedication, patience, flexibility and loyalty.

A bad mentor can be as damaging as a good mentor can be helpful. A bad mentor is often someone who does not understand the need to balance criticism with reinforcement and encouragement. Bad mentors tend to misunderstand the negative impact of too critical an approach, and lack self-awareness in their relationships with others. Sometimes, a bad mentor is so focused on what they want out of the relationship (e.g., student assistance in running subjects) that they fail to provide the student with a meaningful learning experience. Interestingly, Cronan-Hillix et al. (1986) found that personality characteristics were the single most important characteristics of a bad mentor, which included being rigid, critical, egocentric, overextended, disorganized and untrustworthy. While the list of characteristics that define a good or bad mentor can be extensive, perhaps the most important individual factor that defines a good mentor is his or her commitment to the role of mentoring.

Mentoring style and mentor characteristics can contribute to the success of a mentoring relationship; however, it is the relationship itself that is most important. To develop the relationship, mentors and protégés must take the time to develop trust (Merriam, 1983). Mutual trust and respect are goals to work toward. It is important that mentors follow through on their commitments, clearly state their expectations, and set clear boundaries. It is important that students feel free to share their fears and failures as well as their joys and successes. When trust exists between the mentor and the student, the student is able to take risks they might not have taken without the trust. The mutual trust between mentor and student provides a safe space for the latter to dare to achieve what might appear difficult, impossible, or overwhelming. The trust the mentor provides is fundamental for the learning experience to occur. Many of us who mentor undergraduate students in research have experienced the feeling of believing that students are capable of more than they think they can accomplish, and being proven right when a student rises to the occasion.

## What We Expect of Mentors and Students

When a faculty member makes a decision to mentor undergraduate research, there are a number of practical factors to consider. Mentoring requires a significant time commitment. The time required will be greatest at the beginning of the project and should lessen as the project continues. The mentor needs to be available to give direction and help the student choose the appropriate research methods. Merkel and Baker (2002) suggest that the most crucial point in the beginning of an undergraduate research collaboration is establishing the mentoring relationship and getting the project going. The student should then begin taking ownership of the project, at which point the mentor's time commitment may lessen. As the student begins to mature as a researcher, the mentor can let the student try out their own ideas but will be ready to step in before serious problems develop.

Another consideration is how much the mentor should be involved. Some mentors prefer to be included in all aspects of the project, which may be seen as collaboration, while other mentors prefer to adopt a teaching role, allowing the student to take the lead. The instructor may determine his or her level of involvement based on the student's prior experience with research. A student with no experience would likely benefit more from a collaborative effort where a student with some research experience may benefit from taking the lead and making more of the decisions. An instructor that sees the student becoming more comfortable and confident (and correct) in their decision-making can begin to pull back from taking the lead.

The long-term responsibilities also need to be considered. Working with a student really does not end as soon as the last analyses are done or even when the last sentence is written. After completing a project, the next logical step is to disseminate the results as an oral presentation or poster at a regional or national conference, or as a journal publication (Lanza, 1988). Sharing research with the community is the ultimate goal and students will learn that more quickly when given the opportunity to participate in these experiences. The mentor can continue to work with the student in any of these endeavors. If the student is going to give an oral presentation, the mentor can review the presentation and give feedback so that the presentation, poster, or publication may be revised as needed to provide the best possible learning experience.

Mentors are often asked for letters of recommendation because they have had the

opportunity to work closely with students and can describe aspects of their knowledge and performance that goes beyond their success in a single course. Mentors not only have the opportunity to observe students' enthusiasm for the field and their work ethic, but may have learned about a student's long-range plans. The mentor's letter of recommendation can say much more about a student's fit in a graduate program than either test scores or grades..

## The Challenges of Mentoring

### *Selecting protégés*

In a booklet published by the Council on Undergraduate Research entitled "How to Get Started in Research", Goodwin and Hoagland (1999) suggest several criteria that could be used in selecting student researchers. First, they suggest that mentors look for students who demonstrate curiosity, arguing that inquisitiveness is fundamental to being a good researcher. In addition, they suggest that mentors look for students they believe will be committed to working hard, motivated by intrinsic interest in the discipline, and able to work well with others. They also suggest that students with high grades are not necessarily the best researchers, as sometimes the best classroom students can become frustrated by the false starts and side-trips inherent to the research process.

But what if you have a student who wants a mentoring relationship but does not fit the description of the model protégé? One suggestion is to team them with students who do have the strong protégé skills. It is likely that this situation can be beneficial to both students, the more experienced student protégé who can take on the role of teacher and the novice student protégé who can learn from a student who has been in their shoes more recently.

### *Choosing a research topic*

The type of research that one engages in with undergraduate students is not restrictive. Because the outcome of the research project does not have any consequences regarding graduation or even publication expectations, the research can be of a riskier nature. In general, the outcome of the research is not as important as learning the research process. Also, undergraduate research does not need to fit with a particular theory; it can simply be based on a question that a student wants to answer. Research with undergraduates can also be of a supplemental focus: looking at a project that has been done and replicating it with a slight variation. Undergraduate research can also be of an exploratory nature that may become the basis of a larger study. For example, the beginnings of programmatic research may be more exploratory rather than based on theory.

Students are most likely to be excited about a research project that provides a chance to address a real and testable hypothesis of interest to the student. Students generally find laboratory exercises with predictable results to be boring. Similarly, challenging questions that do not lend themselves to a straightforward research methodology can often generate data that defies interpretation, which students also find frustrating. When undergraduate students work on "real" research projects they are more likely to get excited and involved.

### *Managing individual and team effort*

If your student research team includes three or more members, you will need to monitor their activity to ensure that everyone contributes their fair share to the effort. Social loafing is most likely to occur when students believe that their individual contributions to the group effort will not be evaluated. To address this, mentors can assign particular tasks to individual group members, structure the project so that the individual's specific contributions can be easily identified, and provide students with a choice as to what tasks they would most like to do.

It is also important to discuss the issue of social loafing and to set clear expectations about what students are expected to do. In addition, a discussion of the time commitment expected could clarify for the students what level of effort is required of the endeavor. This discussion of expectations should also include some idea of what the indicators are that the research project is completed, for example, what is an adequate number of participants in the study. Finally, when students work together in research teams, it is helpful to have all members of the team evaluate everyone's contribution on each of the research tasks. This evaluation should recognize not everyone is expected to contribute equally in all areas, but that in total, each student will contribute their fair share.

A second issue in the area of managing individual and team efforts is how to handle those students engaged in a group project who want to go-it-alone. Often these students are high achievers who would rather do it all than be pulled down by less committed peers. To address this, one can structure the tasks so that no one person can handle all of the jobs required to successfully complete the research project. When high achievers realize that they must work with others, they often assume leadership roles within the group. This emergent student leadership

can be very useful to mentors in managing the day-to-day activities of the research team.

### *Providing direction*

Students differ in the amount and type of direction they need and this need varies at different stages of the research process. Encourage students to take an active role in the critical feedback process. Ask them what feedback they need on particular tasks and at particular stages. It is important in working with undergraduate students to keep the research project on track. To do this, it may be helpful to hold weekly group status meetings with all of the students you are mentoring to utilize social comparison processes as well as making you aware of where additional direction is needed. Having a written research plan and schedule to check the students' progress is also helpful. Mentors and protégés should agree on how often they will meet face-to-face and when e-mail is appropriate for certain communications. It is also helpful for mentors to develop a system for remembering previous conversations with students so that the student doesn't have to provide a lengthy introduction before asking about the situation on his or her mind at the moment. Building the research group as a supportive learning community by having students help one another, engaging in social activities outside of the research lab, and being readily available to advise students when things become confusing all help to keep projects on track.

### *Handling disappointment*

Students need to be free to make mistakes but this does not mean that they will like doing so. It is important that mentors explain that it is not a failure when data does not support the student's hypothesis and in fact, that is the point of science - to test, not confirm hypotheses. Mentors must be prepared to soften the disappointment when things do not turn out as expected. On the other hand, if part of the problem in not finding evidence in support of the hypothesis is due to a failure on the part of the student researcher, then those mistakes should be discussed so that the student is better prepared for the next research project. This process places the mentor in the role of encouraging the student to reflect upon the research experience in order to learn from the process, including the mistakes made (see Koerner, Rust & Baumgartner, 2002).

### *Research Ethics*

Additional challenges for mentors concern the issues of research ethics, intellectual property and dual-roles. It is important for the mentor to be sure that the student is aware of research ethics and how ethical rules apply to practical research decisions. In many institutions, students as well as faculty are required to complete human subjects training. Mentors can encourage students to complete this training even if they are not required to take it. When it comes to intellectual property, mentors and their students should discuss who retains the rights to the work if it is collaborative, and why. Some of the specific questions identified by Merkel and Baker (2002) are: How will authorship of papers be handled? Who owns the research? Can a student take the data from the laboratory at the end of the summer? These are issues that can be handled in a variety of ways but it is important that they be addressed early in the relationship.

Mentors are almost always thrust into a dual role situation. A mentor may be working with a student on an independent project, but may also be the student's instructor in a class, academic advisor, or the advisor for an organization to which the student belongs. The mentor could also be a student's neighbor, landlord, or employer. To avoid potential difficulties associated with dual roles, boundaries should be established and mutually agreed to as soon as possible.

## The Benefits of Mentoring

From the student's perspective, the benefits of being mentored include a sense of inclusion (Boyle & Boice, 1998), assistance in establishing career goals (Bogat & Redner, 1985), and the development of research skills, which can help the student to adapt quickly to new situations and to solve difficult problems (Gonzalez, 2001). Involvement with a mentor has also been linked to student retention, satisfaction with college, and academic achievement (Astin, 1984). Johnson and Huwe (2003) suggest that while a student can be successful without mentoring, there is clearly a strong connection to success in graduate school and beyond when mentoring has occurred. Garfield (1987) suggests that one of the primary benefits for the undergraduate involved in research is based on the close relationship that is built between a student researcher and a faculty mentor.

Lanza (1988) describes a number of benefits for the undergraduate student researcher. They include providing the students with concrete knowledge and skills, as well as an opportunity to mature

emotionally. While students will clearly learn information in a specific area, they are also likely to learn specific technical skills. In addition, they are likely to improve their general research skills to include activities such as conducting a literature review, computer use, statistical analysis, and strengthening their verbal and written communication skills. Lanza also suggests that undergraduate students who experience success in a research project will seek greater challenges in the future.

Benefits identified for the senior faculty who are involved in mentoring students in research include intellectual stimulation, improvement of their managerial skills (Reich, 1986), and an opportunity for reflection and review of their own teaching (Boyle & Boice, 1998; Nicholls, 2002). Other benefits for mentors can include gaining a sense of satisfaction through helping and passing on knowledge, values, and skills; acquiring opportunities for rejuvenation; enhancing productivity via increased research activity; opportunities for convention presentations and publications; and augmenting one's influence because the mentor is viewed as a leader (Davis, 1999).

## Conclusions

While teaching in the classroom setting is enjoyable, we feel that mentoring undergraduate research has been truly rewarding. Lanza (1988) suggests that the mentor should excite and engage students by demonstrating that they are essential contributors. She also suggests that the mentor must care about student progress, communicate this attitude to each student, and be flexible enough to use different strategies with different individuals. The research mentor needs the sensitivity, patience, and ability to respond to each student individually. In the words of Merkel and Baker (2002, p. 4) "Mentors gain personal satisfaction from working with students. They often enjoy training the next generation, watching students mature intellectually, and knowing that they played an integral part in that process. Students can bring a fresh perspective to the work because they have not developed biases about what should or should not happen, and they might ask the simple questions that are often overlooked when one has been immersed in the research for a long time."

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# Collaboration: Faculty Perspective

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Over the past decade and a half, I have worked with many undergraduates as teaching assistants, research assistants on my projects, and advisees who conduct research for honors or other advanced programs. However, in very few cases have I had the special opportunity to genuinely collaborate with a student on research. The materials that follow define collaboration and set it apart from other modes of working with undergraduates, discuss selection processes, goals, challenges, and advantages of collaboration, and provide examples from my work with an outstanding undergraduate student, Joseph Hamm. I conclude this chapter with specific recommendations about teaching ethical behavior, ethical concerns in collaboration with undergraduates, and recognition of the larger mission of collaboration beyond the context of course requirements or the university as a whole.

## Collaboration

The word "collaboration" has roots in the Latin *collaborare*, meaning to labor together (Simpson & Weiner, 2002). A collaborative relationship involves two or more people who strive for a common goal, as is common in many approaches to conducting research with undergraduates. Collaboration is distinct from other modes of work with undergraduates, however, in that collaboration implies substantive contributions and creative control from both parties. To clarify this distinction, I have advised many excellent undergraduates who have had unique and productive learning experiences working on my research or in my laboratory, but in these cases I directed the goals, methods, analyses, and interpretations throughout the work. I have also advised many students in honors theses and other activities that require the student to generate a research idea with my guidance. Collaboration, as used in this chapter, suggests a more balanced working relationship in which the student and the faculty member can contribute ideas, adapt methods, and critique each other's work. This mode of work takes the faculty member and the undergraduate researcher as close as possible to the model that often exists in graduate programs and in collaborative relationships between faculty peers.

I have been very fortunate to inherit a model for collaboration from my own graduate research advisor, Wayne Viney, whose student-centered approach guides my own perspectives today. When I was his graduate advisee, Wayne Viney allowed me freedom to direct our research, and he gently applied his guidance to keep me on track when my inexperience or developing views of the literature did not permit me to see the entire situation. Beyond all of this, he provided a solid foundation of trust and encouragement even in the midst of false starts and dead ends. I had to walk my own road, but I could walk it with his support and guidance. I attempt to bring this model to my work with undergraduate collaborators.

## Student Collaborators

Who are the students with whom I have collaborated in research, and what sets these students apart from other undergraduates with whom I have worked? Undergraduates are a very diverse group, often with little to no research experience outside of class. Even though many of these students will go on to become outstanding psychological researchers, only a few are ready to collaborate with a faculty member. I try to place students into research situations that fit them best and provide the most productive learning experiences.

Some students approach me armed only with the knowledge that they want to get a taste of research. These students may work in my research program to assist with data collection, data entry, and general discussion of ideas. These students will be most successful in a supervised relationship (see Forrest, Stastny, & Bruns, 2008). I hope to involve these students in dissemination of the study, often by having them join me in an oral presentation in which they present the literature review or the methodology of our study before I present the results and discussion and then answer questions. These experiences provide neophyte researchers with an introduction to the activities of research. Some of these students then excitedly enter graduate school

having had exceptional research and presentation experiences for undergraduates. A rare few students, however, are ready to go beyond these activities and to contribute substantially to a project that they can share with a faculty member.

On the continuum of preparedness for research collaboration, there are many undergraduates poised to function as successful graduate students in the future. A few atypical students are already prepared educationally and personally to enter into a collaborative research relationship with a faculty member. Other students may be nurtured and mentored to achieve this level of preparedness through extensive coursework and independent study. In either situation, the standards and expectations for student collaborators are higher than standards for other undergraduate researchers. I envision these collaborations as guided preparation for graduate school, and I attempt to encourage undergraduates to function as much like graduate students as possible. I aspire to provide a guided journey from advanced undergraduate student to graduate advisee. Students may start with substantial direction in reading materials, methodological paradigms, and earlier work in my program and others' programs of research, but students soon have the tools to collaborate with me as a graduate student would. I hope that student collaborators can learn whether they enjoy research and, if so, that their confidence in their abilities can grow from their knowledge of what to expect in graduate school. My unstated goals are to provide each collaborator with, in the words of my Mother, "roots and wings" so that he or she has a strong research foundation and the literary, methodological, analytic, and interpretive tools to reach beyond the achievements of our collaboration. My collaboration with Joseph Hamm provides an outstanding example of these explicit and implicit activities.

I formally met Joseph Hamm two years ago when he approached me to serve as his mentor in the Ronald E. McNair Postbaccalaureate Achievement Program, an outstanding undergraduate research program that connects dedicated students and faculty mentors to better prepare students for graduate school and other future endeavors. I had advised McNair scholars before and had participated as an advisor to advanced individual projects. Joe rose beyond my expectations to emerge as a genuine collaborator. Our early meetings shaped this relationship. Through many early meetings, Joe rose to meet and exceed my demanding and increasing standards. As I consistently raised my standards, Joe continued to surpass them. His project began as an extension of a project in my research program, but he took on increasingly larger responsibilities and emerged as a solid collaborator, not on his undergraduate paper or on my research program, but in our work (see Hamm, 2008).

Joe's project provides an excellent model for the processes I describe above. When he arrived at our initial meetings, he was interested in topics in jury decision making. His openness and the rigid timeline required by the McNair program inspired me to be fairly directive about where his research should go if these options fit his interests. I clearly informed him that I expected him to function independently. He rose to the occasion. After our initial meetings we signed, as required by the McNair program, a contract describing our working relationship, and we defined it in a collaborative manner. Particularly due to the short timeline (i.e., we signed our agreement in the fall, and his final project was to be presented at the national McNair convention the following summer), I provided definitive structure for him, including a general topic, methodology, and some key names to investigate in the literature, but the next steps were his. He conducted an excellent literature review, and he prepared outstanding work for every meeting. I continued to ease my guidance, and he functioned increasingly independently. He collected the data, entered the data, and ran the analysis. His writing was and is superb, and he dealt very well with my *brutal editing pencil of doom* that often challenges students. He found opportunities in my comments, and his already exemplary writing made this process easier.

Through this process, the student shares, as Joe did, responsibility for the creative endeavors. The student has the responsibility to contribute, even when contributions are difficult to generate, and in this approach it is the responsibility of the faculty member to provide a safe environment for the student to struggle with a safety net and appropriate reassurance. If I had provided Joe with my answers to our methodological questions, as I often do with students who assist with my research, he would have missed the learning opportunities that come with walking a challenging road. Years ago, as I struggled in a context outside of academia, one very important anonymous mentor asked me (personal communication, September, 1997), "what would you learn if your advisor wrote your thesis for you?" Joe rose smoothly to these occasions and appeared to thrive on the experiential learning opportunities; I hope he will look upon them positively in his future work.

## Challenges

Significant responsibilities and challenges exist for the faculty member in these processes. Our

willingness to collaborate means that I choose to not make research decisions by fiat. I must consult with my collaborator, respect his or her judgment and ideas, and be willing to take the risks involved. Joe made these processes straightforward and fun. In my already-busy schedule I must find substantial time weekly or semi-weekly to meet with my collaborator, even if my institution provides limited encouragement for collaboration with undergraduates. Balance with my other teaching, research, and service responsibilities remains elusive, and time spent in research collaboration reduces time available for other activities. Without the substantial reinforcement available at institutions such as the University of Wisconsin – Eau Claire (Lind, 2008), the rewards I reap from our collaboration must transcend my annual evaluation for teaching and research.

Beyond academic concerns, I must seek balance across other areas of my life. For example, Joe's second research semester with McNair happened just before my wedding. There was a lot happening. In the summer, I was briefly out of town when Joe conducted his initial analyses, and my absence led to the most tangible challenge of our collaboration. The McNair program statistician guided Joe to select a single analytical approach for all of his dependent variables, even if this required him to convert continuous dependent variables into categories. When I returned, I helped Joe successfully navigate our more appropriate analytic procedures, but this challenge would not have emerged had I not taken time for balance in my own life.

For all student collaborators through all of the academic and other challenges in collaborative work, my most important goal is to provide the best fit for research with each student. In my work with Joe, he functioned increasingly as an independent graduate collaborator; other advisees may need more structure, help, and specific direction at each step.

## Advantages

The tangible advantages of working with undergraduates vary with the culture of the institution. As noted previously, at universities where student-faculty collaboration is explicitly encouraged, many concrete rewards are available in terms of intra-university grants, emphasis on collaboration with undergraduates in professional evaluations, and potential accolades (see Lind, 2008). At other institutions, tangible rewards remain limited, and the important yet harder to quantify sense of personal fulfillment is the most substantial reinforcement.

At the University of Northern Colorado I have limited opportunities to work with graduate students, and collaboration with undergraduates brings me as close as possible to these experiences, even if my time, administrative encouragement, and the student's time at my institution remain limited. My own research program benefits from the fresh perspectives and energy of undergraduate collaborators, and I learn from being open to the breadth of ideas that adept undergraduate students can bring to my research. Beyond ideological contributions, undergraduate collaborators share responsibility for much of the extensive work required for a high-quality research project. The efforts of undergraduate collaborators can allow faculty members more time to attend to other teaching, research, and service responsibilities. More concretely, undergraduate researchers may have access to funding for research and travel that would otherwise be unavailable to faculty members. Additionally, such collaborations can bring products that may even please administrators, including presentations of high quality research in the peer-reviewed section of regional conventions (e.g., Hamm, Stewart, & Woody, 2007), national conference presentations (e.g., Woody & Thomas, 2002), and potential publications (Semple & Woody, 2007).

## Ethics

Faculty members too often expect students to learn ethics "by osmosis" (Handelsman, 1986, p. 371). Undergraduates may receive limited education in ethics of research, and faculty members have responsibilities to address ethical questions explicitly throughout the collaboration (Woody, 2006). Faculty members must address general ethical principles and openly walk undergraduate collaborators through specific decisions and questions that arise in the collaborative research design. For example, although a faculty member may thoroughly understand appropriate uses of deception in research, he or she should explicitly discuss how and why a particular method of deception was chosen and why other options are not appropriate. Faculty members should not assume that undergraduate collaborators are familiar with the role and function of a university Internal Review Board, ethical methods of handling research animals, or the legal and administrative steps required to maintain participants' confidentiality and anonymity while handling data. Explicit consideration of these and other ethical issues will better prepare undergraduate collaborators for future research opportunities as graduate students.

Beyond these concerns about teaching ethics in research, faculty mentors must remain aware of the potential for unethical behavior in collaborative relationships and of long term consequences of unethical treatment of students (Woody, 2004b). Faculty members may benefit from overworking and under-rewarding student collaborators, and in this way faculty members can be reinforced for mistreating undergraduate students in some of the same ways that faculty members can benefit from mistreating graduate students (see Woody, 2004a). In general, we must remain aware of the broad welfare of our students, and we must treat them as individuals with integrity. These concerns drive many specific behaviors and general themes (see Woody, 2006) addressed by the Ethical Principles of Psychologists and Code of Conduct (American Psychological Association, 2002). We must be competent in the research area as well as unbiased and fair when we decide with whom we will work and how we will work with each collaborator. We must avoid inappropriate and dual relationships, respect collaborators' confidentiality, and provide them with the opportunity for informed consent regarding the activities of research so that students have appropriate expectations about time commitments, responsibilities, and our standards. We must appropriately discuss publication and presentation credit very early in the collaboration (American Psychological Association, 2002), and, obviously, we must not appropriate their work for our own benefit. Beyond these formally codified requirements, we must remain aware of their workloads at the university and the ways that university work fits into their larger schedules that may include coursework, familial responsibilities, financial limitations, outside employment, and other activities (Woody, 2004a). Respect for the student as a human being with integrity guides all of these requirements and must inform specific ethical questions not explicitly addressed above.

The collaborative learning relationship forms the heart of the academic process of learning. The student has chosen to endure financial hardship and academic rigor far beyond the typical undergraduate program for the sake of collaborating with a faculty member. This is the model by which Aristotle learned from Plato (Russell, 1945/1967), by which Peter Abelard studied with and surpassed William de Champeaux (Abelard, 1922/1972), and by which G. Stanley Hall studied with William James to earn what some consider the first American Ph.D. in psychology in 1878 (Ross, 1972). As faculty and students compile chapters for this volume, we contribute our experiences to broadening the ways that students can grow. Our responsibilities lie with the student. The student should have the roots to anchor him or her firmly to the foundations of research in psychological science, and the student should have the wings to fly far beyond our collaboration. We succeed when our students extend our work and our discipline beyond our own contributions (Woody, 2006).

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# Collaboration: Student Perspective

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On a fairly average day during my first semester of college, I found myself sitting in my introduction to criminal justice classroom before class trying to look as awake as my completely sleep deprived posture could manage. I was a typical freshman at the University of Northern Colorado, wanting to learn but wanting to find a way to do it passively. As class time neared, an unfamiliar academic entered the room. During his guest lecture, Dr. Woody explained his previous research and lit a fire of curiosity within me. Little did I know, that entirely impersonal introduction would have the second greatest impact of any single moment in my academic life.

Sometime during the second semester of my sophomore year, I made a personal decision to change my role in my college career from passive to active. I decided to actively pursue opportunities to maximize my educational investment. Sometime thereafter I received an email invitation to apply to become a member of the 2005-2006 cohort of the Ronald E. McNair Postbaccalaureate Achievement Program. The McNair scholars program is a federally funded program aimed at increasing the number of students from backgrounds that are typically underrepresented in graduate school by providing a structure for them to conduct original research with faculty mentorship. Without knowing anything about the program, I applied. That application would have the greatest impact of any single moment in my academic life.

During the course of the selection process, I steadily learned more about the McNair scholars program. By the time of the final interview, I knew that the program was my niche in academia. The opportunity to become an undergraduate researcher and producer of knowledge beckoned me though I knew next to nothing about what it would mean. As one of our first assignments in the program, my cohort and I were asked to select three potential mentors for our research. Most of my cohort had a fairly solid idea of what they wanted to study but were at a loss as to with whom they wanted to work. I, however, knew exactly with whom I wanted to work, but I had only a vague idea of what I wanted to study. During our preliminary conversation, Dr. Woody was very straightforward about how exactly he saw our potential mentor-student relationship. On that first day, I had a very rough but surprisingly accurate understanding of how the next two years were to play out. The outline of our relationship was provided by the scholars program, but all of the details were left to my mentor and myself. Dr. Woody informed me that he would expect a situation very much like one found in a graduate program. He would be very available when needed, but the motivation would be entirely left up to me. He also informed me that he took revisions very seriously and would be likely to give a great deal of feedback on anything submitted to him.

As I mentioned, I was in a unique situation when compared to my fellow scholars. Most of them seemed to feel very strongly about a topic that they wanted to research. My specific topic came instead out of conversations with my mentor. I came to him as a fairly blank slate with a direction but nothing even resembling a course. After a very focused conversation, we were able to identify a specific question that fascinated me and that he believed could be completed in the span of the McNair program. We intended to examine how a group of mock jurors would react if they read a case summary in which the age and competency of the defendant were systematically manipulated as between-participants independent variables.

Following the McNair outline, the first step was a comprehensive review of the current literature on the topic. During one of our meetings, Dr. Woody walked me through the search for current literature and gave me a list of major names in the fields of juvenile defendants and the research that tried to determine how their age or other characteristics interacted with jurors' verdict and beliefs about defendants. From that information and preliminary list, I spent many a late night at the university library compiling an extensive stack of papers on everything from evaluating juvenile defendants' competencies to defendant-jury interaction. The process of reading the articles and compiling the information into a manageable entity was predominately mine. McNair made small assignments due weekly, so most of the early revision process included passing drafts back and forth with the McNair office, but the last few

were almost exclusively with Dr. Woody. As he had warned me, the drafts I sent Dr. Woody were always returned with almost more red than black ink. However, his suggestions tended to be just that—suggestions. He never wrote anything for me or reacted negatively when I did not take his advice on word choice or structure. This tended to work well for me as I thrive on feedback, but tend to be very opinionated in my writing style.

After completing the literature review, which would later become the first few pages of my research paper, the next assignment was to make the then theoretical construct of the research itself into something we could empirically study. Over the course of the next few weeks and after many office visits and emails, we decided on independent variables, a stimulus, and a population. Dr. Woody would tend to lead the conversations but was always ready to stop and explain or hear a counterpoint. The population was to be undergraduates at a regional university, and the stimulus was to be an amended version of one he had used in a previous study. He gave me a copy of the stimulus and questionnaire, as it appeared when he had previously used it. During the following week, I read over the materials and edited where I felt appropriate for our study with the Microsoft "Track Changes" function with which I had become so familiar. When I felt comfortable with the stimulus, I sent the file back to Dr. Woody for his approval.

The next step in our endeavor was to obtain approval for our project with the Institutional Review Board at UNC. The process was explained to me within the McNair program, and I had known for some time that this was something Dr. Woody would take particularly seriously. The Institutional Review Board (IRB) at UNC knew his work and expected nothing but the best if it had his name on it. Consequently, he did most of the work on preparing the proposal, but he was careful to keep me involved. He sent the proposal to me for my approval and assembly before it was completed. Finally, though I am quite sure that he would have done it himself, he had me physically submit the proposal. This seemingly menial task, which quickly became a cross-campus treasure hunt, gave me the basic knowledge of where such papers were reviewed, knowledge that escapes most other undergraduates but which faculty can take for granted. After several weeks, our project was approved and the game began.

With our project officially in motion, Dr. Woody and I began data collection. In yet another series of meetings in his office, we formalized our strategy. The responsibility for collecting the data would be placed squarely on my shoulders, but I was prepared, having received a great amount of advice. In the subsequent meetings we discussed everything from professors who had been receptive to providing class time for data collection to a demonstration of how to walk around a classroom while the participants were working through the stimulus. He shared his own tips and tricks and even offered to allow me to use a lecture from him as a bargaining chip when talking with the professors. Three professors were kind enough to offer me their students as participants as approved by the IRB. The week before data collection, I sat in Dr. Woody's office for one last go-over of the procedure and a pep talk. The following week I entered each classroom with my own self confidence, his confidence in me, and his personal phone number in case the unthinkable should happen. I do not remember ever using the number, but it was comforting to have this recourse.

The end of data collection ushered in the onerous task of data entry. Gathered around the warm glow of the flat screen monitor, Dr. Woody walked me through the Excel spreadsheet and codebook he had prepared for our data and wished me well. The next few weeks left me skilled in the operation of the oft-ignored numeric keypad on the right side of every keyboard, a skill I had never had the time or inclination to practice before.

After all of the data had been entered, the next step was to try to make some sense out of it all. It was now summer and Dr. Woody had become much more difficult to access than previously because of his wedding. He had warned me long before that he would be hard to reach at times over the summer, a courtesy not all of my McNair colleagues were afforded by their mentors. In the interests of keeping with my deadlines in the McNair program, I spoke with the program's staff statistician. She helped me run the statistics that I had originally intended, but she expressed her disagreement with the methodological design. She felt that our tests would be inappropriate for the data. She was kind enough to take the time to help me find what she believed to be a more accurate test.

When Dr. Woody returned from his wedding, he and I met to discuss the statistics. I had emailed him with weekly (or so) updates of what I had been doing. I showed him the analysis that I had run with the McNair statistician, both the original and the new ones. Dr. Woody seemed slightly put off by my newfound doubt in our methodological design, but he took the time to show me exactly what she was talking about and how it really would not make much of a difference for our particular project. He then explained that the statistics that the statistician was suggesting were different from those that would be expected at a psychology conference. He showed me

the expectations of our field and helped me understand how and why to "speak their language."

After two or three meetings with Dr. Woody to analyze our data and the several hours I spent in the statistics lab, we were ready to start writing the paper. Oddly enough, writing the paper was the part of research I entered with the most personal confidence and yet, the part with which I needed the most help. I knew the project inside and out by this time, but I did not understand my audience as well as I could have hoped. As the McNair program instructed us, I took the literature review and research proposal that I had already written as my starting block. I worked my way through the methodology, discussion and conclusion, but I had no idea how to even attempt the results section. I sent my very rough draft to Dr. Woody and the McNair assistant director in order to get as much feedback as possible in the shortest amount of time as it was already halfway through the summer. I got the draft from the program staff first, and it was very focused upon the mechanics of the paper. By the time I made those corrections, I had received the draft from Dr. Woody. His corrections covered the mechanics of the paper as well as the bigger picture. He also made suggestions about wording and terminology that were specific to our discipline. After we had made headway on the rest of the paper, we met to discuss the results section. Dr. Woody talked me through the essentials of what should be covered and what a results section actually is. After I was fairly comfortable with it, he sent me home with a few examples from his previous papers. My second draft was still extremely rough, but with subsequent revisions (entirely between Dr. Woody and myself) we were able to smooth the edges into something very effective. Upon its completion, the project was submitted to the UNC McNair Research Journal.

Over the course of the McNair program, the project was presented three times, twice at undergraduate conferences and once at a regional professional conference. Dr. Woody's support played a huge role for each presentation. For the poster presentation, not only did he review the poster itself, but I remember coming into his office just to talk about the project in general so that I could feel like I had a better grasp on the research area as a whole.

One of the presentations took place on campus and Dr. Woody was able to attend. I had not expected to see him there but it was quite the pleasant surprise. I still remember the pep talk he gave me before my presentation. His confidence gave me that last little bit that I needed. In spite of this support, I honestly felt that it was the worst presentation I had ever given. The week leading up to the symposium had been particularly busy and as such I had approached the day lacking significantly in preparation for the specific presentation. Also, after having explained my research to friends and family a mere thousand times beforehand, I had become quite proficient at explaining the bare essentials of the study in a very short time. The symposium itinerary gave each student fifteen minutes to present and the subsequent five minutes for questions. When my turn came, I stepped to the front of the room and began the recitation of my presentation. I remember wondering if I was moving too quickly through my slides, but I did not want to slow down too much for fear that I would go over my time. At the end, I realized that between the accelerated pace of speech from my under preparation and my expertise in summarizing, I had managed to leave myself a full ten minutes for questions. The audience was kind enough to invent questions to fill the time, but I knew I had delivered my personal worst presentation. Even so, Dr. Woody remained positive and without lying to me, he kept me positive and left me simply wanting to be sure to become more comfortable estimating fifteen minutes without a clock by over-practicing my presentation next time. I had my chance the following spring while preparing to present at the 2007 Rocky Mountain Psychological Association conference in Denver where I delivered what I consider to be my single best research presentation to date.

Over the course of this student/mentor relationship several effective practices became apparent to me. First, I believe that the fact that the drive to conduct undergraduate research was birthed within myself created an internal locus of motivation. My mentoring relationship with Dr. Woody began with my taking an active role in the research and established a theme for the duration. Also, when I approached Dr. Woody, our initial meeting included the establishment of a series of expectations that he had for the relationship. These expectations included whether or not he expected complete creative control, how involved he intended to be, who the principal researcher would be, what he expected from me and how the project would be submitted for publication. I was also encouraged to express my own expectations. McNair had done a great job priming my cohort to consider our expectations, but this did not preclude a moderate level of difficulty when identifying them.

Finally, we developed an outline/timeline for the project. McNair gave Dr. Woody and I a fairly extensive and specific timeline for the major steps of the project, specifically, a review of current literature, a formal literature review, a research proposal, an IRB proposal, the development of the methodology, data collection, data entry and analysis, and that period where one tries to make sense out of it all. However, we were still left with a great deal of

autonomy regarding the smaller steps in between. Every step of my specific research followed a rather specific formula that seemed to be particularly effective. Each step began with my reading the McNair outline/timeline to determine what the next step was to be. It was helpful for me that Dr. Woody was aware of the steps required so that he also knew what was coming up, but I do not remember a time when he ever had to remind me to get started on something that I had forgotten. The next step was always to email Dr. Woody to set up an appointment to meet with him and discuss what needed to be done. It was in these meetings that Dr. Woody would explain the procedure and make the step practical. He would also take these meetings to explain the more theoretical constructs of the steps and their place in the big picture. The next step would be for me to actually do whatever it was that needed to be done. I would then take the product of my labors to Dr. Woody for his review. As necessary, he would revise my work or redirect my efforts. This exchange would continue until we were both satisfied with the product. My satisfaction did seem to take precedence, but my mentor was always there to ensure that we had a quality product.

Our arrangement had only one major drawback, and it was the turn-around time. Like every college student, I frequently had many academic and personal projects on my plate at any one time. On two separate occasions I had to ask the McNair office for an extension on a deadline because I had taken too long writing a portion of the paper and had not given Dr. Woody enough time to look over it. He did the best his busy schedule could permit him to do to hurry the papers back to me. Since the deadlines for the McNair program were my responsibility, he left the bulk of the responsibility for making those time lines on my shoulders. Happily, the McNair office was particularly understanding both times.

My experiences with Dr. Woody have certainly shaped my academic career. With his guidance and challenging, I have changed from a passive undergraduate to one that is much more actively involved in choosing his own future. I now have a real love for research that had been stifled by problematic experiences in classrooms before McNair. These classroom experiences lacked the one-on-one direction that was tailored to a specific research discipline and the project at hand. We were able to delve much deeper and complete much better research than is possible in a one-semester research methods class of thirty-odd students. His willingness to explain and really show me the “ins and outs” of research gave me a feeling of ownership in the process that was incredibly helpful in fielding questions and preparing presentations. I felt as though I had real creative control of the research, whether or not I truly did. What my mentor would have done if I had been particularly attached to what he had seen as a bad idea is unknown, but his confidence in my intellect spurred me on. I am exceedingly grateful for this mentoring relationship that has been so pivotal in bringing me to where I am today.

# Supervising Undergraduate Students in a Faculty Driven Research Program

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Can you teach at a small liberal arts institution and conduct research in your field of interest? Have you ever wanted to have nationally or internationally recognized research? It is possible at a small college or university if you take advantage of your most valuable asset, the student research assistant.

This chapter has three goals. First we will address the major differences between faculty driven and student driven research programs including the conditions under which faculty driven programs are better suited. Second, we will discuss the benefits and costs to a faculty driven program for both professors and students. Finally, we will present some practical advice for the implementation of faculty driven programs, using current programs as examples.

## Faculty Driven vs. Student Driven Research Programs

Within a faculty driven research program, professors have preexisting hypotheses or research programs for which they need assistance. Perhaps the primary researcher or faculty member has been working in a particular area for a long time and is systematically investigating related issues. One such example of a faculty driven research agenda is our current UNK program investigating police interrogation strategies. Studies in this area range from systematic investigation of the interrogation strategies themselves to an examination of jurors' perceptions of those strategies. Since 1999, the first author has been investigating the influence of certain strategies on suspect confessions. Each year, one or two students join her in this endeavor. Another such program involves Linda Henkel's work in aging and cognition at Fairfield University in Connecticut. With support from the National Institute on Aging in the form of a 3 year Academic Research Enhancement Award (AREA), she has been able to support over 30 students in their quest to understand how repeated attempts to remember information can lead to false memories (Henkel, 2006).

These types of research programs differ from student driven research or independent study because student driven programs usually involve hypotheses generated, examined, and presented by students under the watchful eye of a faculty mentor. As independent research at the undergraduate level gains momentum (Kierniesky, 2005), it becomes important to distinguish when a faculty driven approach can be practical if not more beneficial for all those involved.

There are several practical reasons for using a faculty driven model of research. First, because some projects have time-consuming methodology, it becomes necessary for different students to collect data. Longitudinal research is probably the most common example of this kind of dilemma. Second, this faculty driven approach is appropriate for those researchers conducting several small studies within a major theme or confirming a common hypothesis several different ways. Instead of just one faculty member conducting sequential research over time, he or she can have several research assistants conduct those studies simultaneously. Third, when investigating a novel area of study, it is not uncommon to test stimulus material or run pilot groups. For example, across several investigations of juror perceptions concerning police interrogation strategies, we have developed several questionnaires and techniques for assessing mock jurors' beliefs. Our findings appear even more reliable because of their convergence across methods. In order to maintain a research program of this type, one or more student researchers per semester are needed. Although the research program itself may last for years, the individual students tend to work only one or two semesters and then graduate.

## Faculty Benefits and Costs

A faculty driven research agenda is an excellent plan for those at institutions with high teaching loads who are striving for tenure and need the requisite presentations and/or publications. Although this type of research program can be beneficial to students, faculty members clearly profit the most. From collecting data in their primary area of interest to making significant contributions to the field, faculty members at smaller institutions can dramatically impact their fields with the support of their undergraduate research assistants. As a result, these faculty members compare favorably to their counterparts at research-intensive institutions where graduate students are plentiful. Standing out in one's field increases chances for external grants and other forms of recognition such as research awards.

In addition to possible scholarship recognition, working with undergraduate assistants in ongoing research programs affords faculty more time in two distinct ways. First, faculty with undergraduate students capable of conducting research can spend more time designing research studies, and less time on day-to day tasks such as collecting and entering data. Second, compared to supervising independent projects based on students' original ideas or methodologies that may not be in professors' primary field, professors may take less time to prepare for individual studies because their research is thematic.

In addition to benefits, there are also possible costs to a faculty driven research agenda. First, researchers may become stagnant if they continue investigating the same issues or if they ignore their students' creative ideas. Second, it can be difficult to sustain "research program memory" when the same study or related studies are conducted by different students over a long period of time. Keeping detailed Institutional Review Board documents and having students keep rigorous procedural notes make it easier to pass on wisdom from one student assistant to another. Third, in a climate of high teaching loads and a "publish or perish" mentality, faculty must plan for adequate supervision of research assistants. Unlike graduate students, faculty supervisors need to monitor undergraduate students who are often at different levels of their academic careers, accordingly. Regardless of the time invested, in the first author's experience, well-prepared, well-supervised undergraduates, perform comparably to average graduate students. Finally, because of the time consuming nature associated with an ongoing research program, we find it challenging to publish as frequently as necessary. Sometimes it takes concentrated effort to step away from the newest hypothesis and spend the required time completing studies for publication.

## Student Benefits and Costs

In addition to faculty benefits, there are numerous benefits for the undergraduate research assistant. Regardless of whether undergraduate research experience occurs in a lab course, as part of an independent study, or within a faculty member's existing research program, students benefit through increased student engagement, intellectual achievement, and preparation for graduate school (Elmes, 2002).

According to Light (2001), Cornell undergraduates surveyed about their reasons for attending the university remarked, "the faculty does cutting-edge research" (p 70). Yet cutting-edge research is not limited to Cornell and students can engage in similar experiences at other institutions. Because the level of interaction between students and their professors depends on student research competencies, experiences, and personal interests, student roles in ongoing faculty research vary from research assistant to collaborator. At any level of interaction, undergraduate students gain knowledge if faculty supervisors require those students to perform at higher levels. These experiences are vital for student success, regardless of whether they ultimately enter graduate school or an occupation upon completion of their undergraduate degrees. Compared to those undergraduates not engaged in the research process, students working with faculty often gain more analytical, presentation, and writing skills (Ishiyama, 2002).

Those students beginning a new research project with previous research experience can work more collaboratively, allowing those students unique opportunities in hypothesis development. In this case, students are encouraged to formulate their own research ideas while simultaneously gaining vast knowledge directly from an expert in that field. These ideas may potentially contribute to the overall research design, which in turn, assists the faculty member in evaluating the hypothesis in a new light. More immediate benefits to students include a better understanding of the positives and negatives of certain research paradigms, statistical tests, and comparisons of current findings to previous results. Given that the faculty supervisors evaluate, design, and monitor the research process at every level of interaction, students may contribute significantly to their supervisors' fields of expertise. As a result, students increase their likelihood of becoming first or subsequent co-authors on publications and conference presentations. This opportunity for

students mirrors those benefits found in many traditional graduate level programs for graduate students. Undoubtedly, undergraduate students are strongly challenged by these research experiences. Yet these challenges create immense opportunities for students to excel as researchers.

Although research assistantships are great resources for students, potential drawbacks should also be considered and addressed. Given the amount of time and energy that goes into the preparation of a study, students often do not get a chance to be involved in the research process during its most crucial stage—namely, when ideas are formed. Often, undergraduates join a program of research long after the initial research has been conducted and the proposal has taken off. As a result, students may develop a better understanding of such activities as observing and collecting data, but lack confidence in their abilities to develop research ideas, construct a working hypothesis, design a test of a working hypothesis, and write articles for publication (Kardash, 2000). This can leave students with limited opportunities to prepare for comparable tasks in graduate school. This finding suggests that student collaboration experiences differ from their assistant experiences. We agree that students with less experience and weaker foundations in the discipline will probably benefit more from serving as research assistants than their more experienced counterparts. Having said that, many students work as apprentices within ongoing research programs prior to developing their own independent research. As a result, their experiences assisting faculty should be beneficial when it comes time to develop their own ideas.

## Tips for Establishing and Maintaining Similar Program

Based on our joint experience, we believe the benefits to a faculty driven research program far outweigh the costs. At this point we would like to share some issues to consider as well as some strategies for implementing a new program in an undergraduate curriculum.

1. *Consider whether you as a faculty member are ready to develop research and advisory relationships with undergraduate students.* Johnson (2002) found that undergraduates often emerge from research experiences lacking certain abilities. He surmised this may be due to the nature and structure of institutional research or, conversely, may reflect the belief that the mentoring (or in our case supervising) process simply occurs through natural interactions (Johnson, 2002). Although mentoring usually distinguished from supervising by the degree to which teaching or guidance is offered, we believe becoming an effective research supervisor is similar to becoming an effective mentor. Therefore, we will apply many of Johnson's thoughts to this process. It can be quite tempting to simply give undergraduates a "laundry list" of things to do and send them on their way. Yet, neither the student nor the supervisor ever really benefit from this type of relationship. Because most new faculty are not born with effective supervisory skills, departments should establish supervisor training guidelines and reward individuals who are effective supervisors (Johnson, 2002). Examples of such rewards could include course release time, mentor recognitions, or even merit pay. If such guidelines are not readily available, individual faculty could spend time establishing ground rules for his or her supervisory experience. For example, an advisor may want to start by considering the costs and benefits of his or her own experiences as a research assistant. Examples could include the characteristics associated with his or her previous successes and/or failures, aspects of the research process needing improvement, and appropriate compensation for research assistants ranging from salary to authorship opportunities. Ways to resolve these issues will vary across researchers and institutions.

2. *Consider whether the current research agenda has the breadth with which to set up a comprehensive research program*. Not all faculty research interests are multifaceted or interrelated. Both characteristics help immensely in creating a productive research agenda supported by undergraduates. In the case of our University of Nebraska at Kearney lab we have two major veins of research currently underway. The first, systematic investigation of factors contributing to success and failure of police interrogations has supported student researchers for six years and resulted in 4 national presentations, 1 international presentation and two publications. Although we attribute much of the success of this research program to the timeliness of the topic, we also believe that continued student interest in conducting this type of research has contributed to its success. We have been actively pursuing the second research agenda, jurors' perceptions of evidence ploys for two years resulting in 1 regional and 3 national presentations. Students co-authored on all but one of those products. Another factor contributing to the success of both of these programs involves their breadth. Zacks and Roediger (2004) outline several criteria to consider when starting a research lab which can assist even veteran investigators in avoiding research ideas which are too narrow. Suggestions relevant to the current article include a)

integrating projects by using either a common body of knowledge or a common methodology, b) considering the larger picture or your ability to apply research outcomes to larger theoretical issues, and c) only pursue those new projects which relate in some way to your existing program.

3. *Consider financial requirements for the type of research necessary and determine if students can be supported across multiple simultaneous or continuous projects*. Regardless, when it comes to developing a new research program or expanding an existing one, often cost is a factor. Yet not all projects require funding other than copying fees or time outside of class or work. At our university, students either volunteer or receive class credit for assisting faculty members. Similar to faculty at other institutions, some professors consider a research assistantship experience as a prerequisite before agreeing to supervise independent studies. Students earning the opportunity to present at a national or international conference are able to apply for university funds specified for that purpose. It is also possible to keep costs down by thinking about economical ways to ask expensive research questions. Consider jury research. Having mock juries composed of college students read scenarios is an inexpensive way to conduct jury research, yet these techniques provide indispensable pilot data. Using this data, researchers refine hypotheses and methodologies prior to conducting more expensive jury studies using paid jury-qualified community members.

4. *Determine the time requirements necessary and available for supervising all stages of individual and or multiple projects.* Regardless of the funds available, other costs of conducting research of this kind involve time and effort. When working with students we have found it particularly helpful when the primary researcher, in this case, the faculty member, maintains active participation at all levels of research. Specifically, faculty members should be actively engaged in reading the articles in the lit review, entering data, running analyses with students, interpreting the results, working on the discussion, and editing and or writing the documents. Because this is the faculty member's project he or she is ultimately responsible for its outcome. However, for students to get the most out of the research process we firmly believe it is also a teaching process. For example, faculty should work with students to understand how and why the project was developed. Since the ultimate goal is to present this research at regional, national or international venues, professors can be assured that the methodology, data and writing is sound because of their continuous involvement. Usually the undergraduates who choose to work as research assistants are among the best but they often have questions, support needs, and concerns.

Professors should consider the amount of time necessary for the level of the students involved and only take on the number of students who can be supervised appropriately. One solution for increasing the number of students who benefit from your expertise while decreasing the time invested involves the use of research teams where students work collaboratively to assist the faculty member. Research teams can include similarly experienced students or differentially experienced students. In the case of differentially experienced student teams, both the professor and the more research savvy underclassmen work together to acclimate the newest researcher.

5. *Develop criteria for different levels of student workers*. Regardless of the experience of the student workers it is important to develop standards or expectations outlining the roles for all participating students and faculty. As faculty researchers, it is not uncommon to have student assistants with different levels of experience or even different motivations for conducting research. For example, students at our institution can take research apprenticeship hours for one, two, or three credit hours. As expected, the number of credit hours corresponds to the amount of work expected. Other students may volunteer to conduct research without receiving credit but hope to co-author a presentation or paper with the faculty researcher. Regardless of the motivation for conducting research, both assistant and supervisor should have clearly defined criteria for performance. Contracts are one way to delineate responsibilities. Information that should be included in this contract includes expectations for the student (i.e., number of hours, specific responsibilities, required meetings), for the faculty member (i.e., degree of supervision, work contributions), and for the product (i.e., database, oral or poster presentation, publication). Given that the expectations for students entering data will be different from the expectations for students presenting research in its entirety to others, contracts make clear what is expected of each assistant.

6. *Maintain active participation at all levels of research.* As we have alluded to before, it is our firm belief that in order for research supervisors to also be truly effective teachers, they must learn to actively involve undergraduates in as many stages of the research process as possible. This is often difficult since faculty members develop research agendas long before students join the lab. Also, because undergraduates have little prior research experience faculty advisors may simply assign readings in a way that forces the undergraduates to play "catch up" rather than discussing those readings with them in a

way that enhances their understanding. In addition to assigned readings for undergraduate assistants, regular meetings should be held to discuss the relevant literature and the "how and why" of the research process beyond data collection or entry procedures. This is no easy task. Because faculty must manage competing demands on their time, the decision to neglect the research teaching process in favor of a minimal supervision is tempting (Johnson & Huwe, 2002). However, if the proper steps are taken, the benefits of the research assistantship for both faculty and students far outweigh the costs.

In addition to having research assistants maintain active participation throughout the process, faculty advisors should do the same. Examples include reading the articles in the literature review, either entering some of the data or reviewing the data entered by students, conducting statistical analysis and explaining rationale to students, remaining involved in the discussion and finally dissemination of results. Depending on their experience, having students edit your work can be eye-opening for all those involved.

7. *Creating a research culture.* Even when students work on such mundane but important tasks as data entry, they should still have a basic understanding of the faculty member's hypothesis, its grounding in theory and the project's relation to other work done in the area.

Quay and Quaglia (2004) describe several ways professors can create a culture in their classrooms that inspires student learning. We have modified some of these principles for the faculty driven research program. First, *create a sense of belonging* in your lab by making sure students know their work is valued and that your success is rooted in their success. Second, *recognize your students' accomplishments, not just their grades*. Although many students will work for course credit or letters of recommendations, other types of success can also be recognized. Examples include understanding the gist of a difficult journal article or learning a new statistical technique. When supervising faculty comment on or even reinforce the improvements students make, it emphasizes the developmental process associated with becoming a researcher. Sometimes an individual student needs recognition or even praise to realize they have achieved an important milestone which is not only immediately fulfilling, but ultimately related to future success. Although grades are important, these latter skills will last much longer and form the foundation of any graduate research program. Third, *work to build moments of excitement into the project*. The most thrilling moment in a research project for us is data analysis. Will the result be what we predicted? Will it be significant? Will it lead to other questions? If you are excited, the students will be excited too. Zacks and Roediger (2004) say it best. "One of the great features of academia is the opportunity for each researcher to identify the questions that gets his or her blood pumping and work on those" (p. 149). Finally, *provide opportunities for students to be leaders and take responsibility for their own research questions*. After the main study is completed or even simultaneously, allow students to ask questions interesting them. Most research projects have more than enough data to allow students to generate and test hypotheses of their own.

## Final Thoughts

Whether you are a new faculty member establishing a comprehensive research program for the first time or a tenured full professor starting a new one, establishing programmatic research supported by undergraduate research assistants provides many benefits and manageable costs. What will make those student experiences different for individuals working with you as compared to your colleagues? The difference is the extent to which working for you involves collaborative as well as teaching moments.

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# Section 6. Sharing the Results of Research

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# Departmental Undergraduate Research Days

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A departmental Undergraduate Research Day (URD) is a great way to showcase undergraduate student research. Basically, an URD can be anything you choose - a mini-convention with oral papers and posters or a smaller venue with just papers or just posters. It can last from a few hours to an all-day event. I recommend a few hours, since it may be during school hours, and students may have to miss classes to attend. At the University of Colorado at Boulder, we hold our URD event during the second to last week of classes in the spring, on a Wednesday afternoon from 3 pm to 5 pm. It is solely a poster session. The last week of classes may allow more students to attend if they have afternoon labs that are not meeting anymore, but the last week is pretty busy for students who may not want to participate or attend that late in the semester. Professors at different schools will need to check with students, view their department schedules, and make decisions about timing.

At the time of this writing, there are some departments that hold an event each semester in the morning, and then end with lunch (e.g., Northeastern Illinois University (Linda Rueckert, personal communication, October 9, 2007)). Some departments invite family and friends (e.g., Fairleigh Dickinson University in Teaneck, NJ (Gretchen Johnson, personal communication, October 9, 2007); Northeastern Illinois University). At Stanford University, the department holds an all day event, with poster sessions and oral sessions, and an invited speaker. They hold their "conference" on a Saturday, with registration for the conference, which includes lunch in small groups with a professor or graduate student who is actively conducting research on campus (Stanford University Department of Psychology, 2007). Western Connecticut State University has an all day event, which is held during the week on a reading day (no classes held). They have a guest speaker, food, poster presentations, and limited oral presentations for outstanding posters (Western Connecticut State University, 2007). Barry University in Miami, Florida has oral presentations, posters, lunch, an invited speaker, and academic games. They also have a scholarship presentation during their event. In cases where friends and family are invited to attend, schools may want to impose a small registration fee to cover some expenses. Some departments have awards, and an award ceremony for the best poster and oral presentations, although these are more common at university-wide research forums (e.g., Purdue University, 2007; University of Maryland, 2007).

## Why Is An URD Event Helpful?

First and foremost, undergraduate students can display their research and get accolades from faculty, peers, and perhaps administrators. Especially at schools where there is a graduate program, undergraduates often feel like their research is not important compared to graduate students' or other professionals' research. This URD event focuses all attention on undergraduates' work or research projects by showcasing *their* honors papers, independent projects, and group projects. In my experience, students beam when a professor or dean shows special interest in their work.

In addition to high praise, students can also experience what it might be like to present at a research conference. The URD event is a safe and more comfortable environment for these students to try out their professional skills. They may be presenting the same poster at a professional conference and can get practice answering questions and feeling comfortable with their ability to answer the questions. Other students who attend to support their friends may actually be inspired to do their own research in the future.

Finally, the URD event takes time out of a busy semester to celebrate the accomplishments of the undergraduates who are working to complete research. Often, faculty are too busy to properly commend students for outstanding work. This event gives faculty the time to show how proud they are of students, and students can feel their own pride for a job well done.

## Organizing Timeline

Obviously, an URD event can be as small or as large as is manageable. Logistics to consider include:

- where the event is held;
- whether or not refreshments will be served;
- who and with what type of research is invited to present;

- who will be invited (or required or given extra credit) to attend; and
- what type(s) of presentations there will be.

If the event is held at the student center, to reserve a space as early as September or October for a spring event may be necessary. Poster display boards may also need to be created a few months in advance (see below for poster display ideas). In preparation for our URD, we tell honors students in the fall about the possibility of presenting in the spring, and we follow up with them during the school year via email and through their advisors to encourage them to participate. About two months before the event, we put out a Call for Abstracts. We hang signs around the department inviting students to submit their names in order to participate. We also send personal invitations to honors students, independent study students, and labs. We have also found it helpful to set up a webpage for materials, information, and deadlines (see our webpage at: http://psych.colorado.edu/urd/home.html). We have the initial deadline for intent to participate about five weeks before the event. Students must send their names, advisors' names, and email addresses to our program chair, who starts a spreadsheet and email list. We use the email list later to remind students of deadlines for getting their abstracts in and getting their posters printed.

Larger departments may want to utilize graduate student help, and smaller departments may want to utilize psychology clubs, Psi Chi clubs, or if the presenters are all seniors, have juniors help each year. For instance, maybe particular classes (e.g., statistics, research design, psychometrics, etc.) may help organize and review projects for the event each year. Helpers may be used to post the Call for Abstracts, to post the signs on the day of the event reminding people of the event, to take pictures at the event, to help setup and tear down, and to help generally during the event. Helpers also can help format the booklet of abstracts and/or help to staple the final booklets together.

About ten days before the event, students must get their abstracts sent via email to our program chair, who makes the book of abstracts. Students must include a title, the author(s), faculty advisor, and a brief (80-150 word) abstract. They must format them according to specific instructions on the webpage (including font, type size, type style), although we still have to reformat many of them. We put all abstracts into a booklet that is the size of 8.5" x 11" paper, folded in half, with one abstract on each "page." We put a colored cover on the front with the event information on the outside.

Other options to consider are:

- whether to have a reception of some kind (we have a fruit, cheese, chips, and cookies spread during the event);
- whether to send invitations to all faculty in the psychology department and maybe to other faculty and college administrators as well;
- whether to have a special way to denote honors theses (we have a bright pink four inch sign with HONORS written on it for those posters); and
- whether to create name tags for presenters and faculty and certificates of participation for presenters.

We also have graduate students help with poster development and formatting (and the webpage also has a poster template that students can download and change to suit their needs).

## Poster Display Options

Displaying posters can be a challenge. At the University of Colorado at Boulder, we use part of the ballroom of the student center. A large room is often needed to accommodate posters, depending on the number of posters. Push pins may be used to hang posters if the facilities available will accommodate it. More likely, free-standing bulletin boards, easels with tri-fold display boards on them, tables with tri-fold display boards on them, or home-made poster stands will be used. Some of these options require an initial investment, but the materials should last a long time. At the University of Colorado, we had some inexpensive poster stands made. They look like an upside-down T with a slot for a 4' x 4' foam board – the T shape gives you two sides on which to display posters.

Overcoming logistical and organizational problems can be time consuming, but a successful undergraduate research day makes it all worthwhile. Students hear about it early in their career, attend a few times before their senior year, and then hopefully present their own research during their senior year. It gives them confidence and experience in case they want to go to graduate school and/or present research at a professional conference later.

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# Celebrating Student Research: Campus-wide Student Research Events

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The impact of undergraduate research experiences across the disciplines is an area that has been receiving a great deal of interest among educators and university administrators. This increased interest may be partly related to a greater emphasis on the role of active learning in the curricula, as well as the demand from the regional accreditation groups for assessment of student learning outcomes. Undergraduate research, in the broadest sense of the term, provides an outlet to address both of these issues. In addition, undergraduate research may be viewed as a way of celebrating many of the components of a successful undergraduate education-the accomplishments of students, faculty, and the university at large (Chapman, 2003).

The benefits of undergraduate research experiences are just now being documented empirically. Researchers have demonstrated that undergraduate research experiences can benefit students by improving their analytic and communication skills, providing opportunities for independent learning, and promoting skills involved in professional and personal development (Elgren & Hensel, 2006; Ishiyama, 2002; Lopatto, 2006). Students benefit from close interaction with faculty members and, through the process of conducting and communicating their research, become more engaged in the academic world and acquire skills that will prepare them for almost any type of career (Chapman, 2003). Undergraduate research experiences seem to be especially helpful in the engagement and retention of first generation, minority, and low income students who are often seen as "at risk" in the academic process (Chapman, 2003; Ishiyama, 2002).

Organizations, such as the Council on Undergraduate Research (CUR) and the Association of American Colleges and Universities (AACU), have made all or part of their missions the promotion and support of undergraduate research in the broadest sense of the term (Elgren & Hensel, 2006; www.aacu.org). In addition to providing workshops and dialogues on various aspects of undergraduate research programs and sponsoring conferences on the topic, CUR and AACU also serve as clearinghouses for information regarding ways in which undergraduate research can be shared with the academic community and beyond, through publications like the *CUR Quarterly* and *Peer Review,* as well as events such as Posters on the Hill.

One way in which institutions can share the benefits of undergraduate research experiences is through campus-wide exhibitions of student work. While it has been relatively common for students in psychology and the natural and physical sciences to participate in undergraduate research endeavors and present the results of their work through a variety of venues, this may have not been the case for many other disciplines in the social sciences, humanities, or business. Often these areas take the relatively narrow view that research is defined only as employing the experimental method and do not see themselves as being "research" based (Ishiyama, 2002). There may also be a misperception in the academic community that students can only learn about research skills from others in their own area of study rather than recognizing the benefit of being exposed to the research/creative endeavors of students from widely diverse disciplines. Indeed, if the purpose of an undergraduate education is to prepare students for a variety of future careers, what more appropriate venue to demonstrate the similarities in skills characteristic of an educated person than to have our students be full participants in a multi-disciplinary campus-wide event.

## Characteristics of Campus-wide Events

An extremely helpful source of information for creating a successful campus-wide event is the CUR web site. This site provides brief summaries of the different types of celebrations of student research that occur at over 100 of its member institutions (http://www.cur.org/Publications/celebrationdays.asp #cali_slo). The institutions represented run the gamut from small private liberal arts colleges (e.g., Doane

College) to large public research universities (e.g., University of Missouri, Columbia).

Most of the institutions represented on the CUR site hold their events in the spring, usually in March or April. Events usually are a half day to a day in length, although there are examples of institutions that have week long research events (e.g., Murray State University). Some institutions, such as Albion College, actually cancel all classes on campus on the day of the event so that as many students as possible can participate and attend the presentations. A few of the institutions combine their events with honors convocations or family weekends as another way to increase the number of participants and extend attendance to members of the local community.

The most frequently used method of research presentation is the poster session. This is especially true for those institutions where the majority of presentations are from the sciences, mathematics, and psychology. Those institutions that are able to attract student participation from a wider variety of disciplines also include demonstrations, oral presentations, artistic performances/exhibitions, and debates. The number of student presentations varies greatly from a few dozen to several hundred. The number of presentations is often influenced by whether or not students are required to conduct and present research as part of their major requirements, are nominated by faculty, or if the students simply desire to present projects that they have worked on as part of a class assignment or independent study. Several schools also produce booklets containing the abstracts for the presentations and/or a list of the participants.

## Specific Examples

Xavier University, a historically black institution in New Orleans, has held a two day "Festival of Scholars" on its campus in April (Crowe, 2006). Approximately 200 students representing disciplines across the university participated in the 2004-2005 event. One of the goals of the event is to increase the number of African-American students who go on to pursue graduate work. The event also serves to reinforce Xavier's movement toward becoming a teacher-scholar campus. The event is sponsored by Xavier's Center for Undergraduate Research, which is dedicated to the support and promotion of undergraduate research, creative endeavors, and other types of scholarly experiences for their students. Funding for the Center comes from a wide variety of sources and the staff works with faculty and students from all areas of the university to find financial backing for undergraduate research projects as a way of making sure that every student who expresses an interest in doing research receives some level of support. Unfortunately, the continued success of this event has been temporarily interrupted by the aftermath of Hurricane Katrina, but the dedication to continuing the effort continues on.

Bellevue University, near Omaha, NE, has an enrollment of approximately 6800 students, with around 50 percent of our students enrolled in online or satellite programs. First generation students make up the majority of our enrollment and we also have a significant number of minority students attending our institution. The use of active learning techniques, as well as the goal of promoting Real Mastery®, makes Bellevue University an ideal place for the promotion of undergraduate research experiences.

Recently, Bellevue University has held two events focused on student research. The events were designed to address two of Bellevue University's assessment objectives; analysis of information, and making informed judgments and effective communication. In 2006, the first College of Arts and Sciences Research Day was held in late April. I organized the event as the campus representative for CUR. Faculty members throughout the college encouraged their students to submit poster proposals based on course projects. Twenty posters, all from psychology and sociology, were displayed in the Durham Student Center from 11:00 am until 3:00 pm. Students stood by their posters during the lunch hour to answer any questions. In addition to the posters, the students in the Advanced Studies in Psychology course held a public presentation of their multi-media group projects which involved communicating the results of scientific research in a publicly accessible way. While the initial turnout was good, the fact that only two disciplines were represented was disappointing. I believe this was partly due to a relatively short start up time, as well as the fact that many of the faculty in the humanities were unsure how to prepare their students for a poster presentation.

During the past year, a writing initiative was implemented on our campus. Beginning in July, 2006, a group of 30 faculty members from throughout the university met on a monthly basis to discuss how to encourage and improve writing in our programs. The initiative was funded by a grant from the Armstrong McDonald Foundation. The culmination of this initiative was the "Celebration of Student Writing" which was held on April 26, 2007 in the Criss Auditorium. The event was advertised campus-wide and to the immediate Bellevue, NE community. Faculty nominated student papers for recognition of excellent writing. Empirical research papers, creative writing, case studies, and samples which "defied categorization" were represented.

Select students from each of our four colleges (Arts and Sciences, Business, Computer Information Technology, and Professional Studies) gave brief readings of their papers. Sean Doolittle, a local author, was the keynote speaker. Eighty-nine students were then presented with certificates recognizing their writing at a luncheon held on campus (P. Artz, personal communication, April 27, 2007). This was the first time that a truly campus-wide event was held recognizing students' scholarly endeavors.

Our future plans involve merging the poster session, multi-media presentations, and recognition of student writing, along with the senior thesis show in art and senior thesis presentations in natural sciences, into one, more cohesive celebration of student scholarship scheduled for April, 2008. We intend to have workshops early in the academic year to support the idea that undergraduate scholarly work in all of its expressions is important to the success of our students and to help faculty members in disciplines which are not necessarily viewed as research oriented to understand their role in the process. We are seeking additional support both from internal sources, as well as external funding agencies.

## Challenges

There are many challenges in organizing campus-wide undergraduate research events. To be truly successful, the entire university community must embrace and support the importance and benefits of undergraduate research at all levels and thus provide the foundation for student presentations. Faculty need to communicate to students that it is the skill set one acquires as part of the research experience as well as the content of their major that will serve them well in their future careers. Moreover, that that skill set includes communicating their research to the public. It can be difficult and potentially threatening for faculty in areas that are not usually recognized as research focused to "think outside of the box" and view their scholarly activities as "research" in the broadest sense. Students also need to be convinced that they can learn from others in widely disparate disciplines and that being part of a community of scholars is not equivalent to being a "geek" (Zimmer, 2005) or that it keeps them from more practical types of careers.

In addition to the conceptual issues, the time and effort which go into organizing and holding a campus-wide event are enormous. Few institutions have offices devoted solely to the support of undergraduate research so the brunt of the work often falls on individual faculty members who are already overbooked with other assignments and who may or may not receive any type of compensation for this type of endeavor. There are also financial considerations to be taken into account when organizing such events. Yet, once these challenges are faced, the benefits of promoting undergraduate research are definitely worth the effort.

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# Undergraduate Research Conferences

**Donna Stuber-McEwen & Kristina Thielen-Belveal**

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Engaging undergraduates in the research process has become an important component that integrates research, teaching, and scholarship within an undergraduate curriculum. The value and importance of including research in the undergraduate psychology curriculum cannot be overstated. The APA Task Force on Undergraduate Psychology Major Competencies reinforces this contention by stating that students should develop the ability to "understand and apply basic research methods in psychology, including research design, data analysis, and interpretation" (Halonen et al., 2002, p. 8). As psychology educators, we recognize that students benefit educationally and professionally when actively involved in the research process. However, "equally important to conducting research is the dissemination of research findings through active engagement in the professional community" (Mandernach, 2006, p. 18). The benefits of presenting research at an undergraduate conference are "tri-fold": They serve the needs of the student, the instructor, and the profession as a whole.

Anyone who has supervised undergraduate research knows that students who follow a project through from its inception to conference presentation truly experience a multidimensional growth spurt that non-involved students do not reach. Students benefit from conference participation through professional development in the form of social networking; the chance to serve as role models to their peers (Tryon, 1985); the application of principles learned in the classroom (Landrum, 2002); exposure to current innovations; the positive influence on graduate school applications (Grover, 2006; Landrum, Jeglum, & Cashin, 2004; Levine, 2000); the opportunity for career exploration and development (Seymour, Hunter, Laursen, & DeAntoni, 2004); and the ability to "reality test" aspirations in the psychology fields (Darden, Nelson, & Parsons, 2005). Undergraduates who present their findings in a public forum also gain a variety of positive experiences that include improved communication skills (Bauer & Bennett, 2003; Kardash, 2000), as well as independence and self-confidence (Seymour et al., 2004; Stuber, 1986). In terms of critical thinking, feedback from conference participation allows students to gain a broader perspective on their work (Muszynski, n.d.).

Perhaps most central to the purpose of the undergraduate convention is its ability to provide students with the opportunity to develop more sophisticated research skills. "By participating in conferences, students learn to communicate their work to others who are genuinely interested in it" (Carsrud, Palladino, Tanke, Aubrecht, & Huber, 1984. p. 143). Additionally, "by presenting and listing to others, students are introduced to formats used at regional and national conventions – a natural first step toward presenting at such a conference" (Stuber-McEwen, Rudmann, Hailstorks, & Nesmith, 1999, p. 2). These students are also more likely to graduate than their non-involved peers (Nagada, Gregerman, Jonides, von Hippel, & Lerner, 1998) and more likely to pursue a graduate degree (Hathaway, Negda, & Gregerman, 2002). Moreover, students who participate in collaborative undergraduate research with faculty early on report "significant gains in the ability to 1) think analytically and logically; 2) put ideas together and note similarities and differences between ideas; 3) learn on their own and find information they need to complete a task" (Ishiyama, 2002, p. 380). Ishiyama also contends that these effects are particularly evident in first-generation college students, whose participation in such research and subsequent one-on-one contact with faculty may negate the effect of less support from families who are not familiar with the collegiate experience (2002).

In terms of the benefits that faculty enjoy, the mentoring relationship that develops between student and instructor can be particularly fulfilling, increasing job satisfaction while helping to create more motivated and engaged students. Unfortunately, the personal role that faculty play in the development of eventual professionals is often minimized. However, Kuh, Nelson Laird, and Umbach (2004) found that the activities faculty participate in and encourage students to participate in, as well as faculty expectations of student performance, influence what students do during college and the benefits that students derive from the collegiate experience. In addition to personal fulfillment, networking among

instructors at conferences can create a valuable support network. "It is not uncommon for faculty members to find others with similar research and teaching interests and thus develop new collegial relationships" (Carsrud et al., 1984, p. 144). These relationships may spawn new research directions or professional opportunities for participating faculty.

The profession of psychology, as a whole, benefits through the exchange of ideas at all levels. The creation of incoming members who are acquainted with the peer review process and collaborative research design is a particular boon to the field. Likewise, professional psychology education profits through the reinvigoration of instructor productivity in the research areas. Networking among faculty at different institutions serves not only to broaden instructional horizons, but also to enhance continuity across curricula by maximizing faculty exposure to current research trends and topics.

## Conference Formats

The types of conventions currently available to undergraduate students are local, regional, national, and asynchronous. Each type has benefits and drawbacks, depending upon the skill level and goals of the student presenter and faculty sponsor.

Local conferences are typically small and involve colleges or universities in relatively close proximity to the host institution. This terminology can also refer to a conference that is intended only for the students enrolled at one particular college. Although local conferences may be smaller and more limited in scope, they do offer an excellent opportunity for fledgling researchers and neophyte faculty sponsors to gain experience, as well provide a vehicle for recruitment from local high schools. Hosting local conferences also gives planners the freedom to move programming away from the more traditional formats and add special events, such as "hands on" exhibits, films, campus tours, alumni presentations, creative or artistic poster competitions, and psychology quiz bowls (Anderson & Rosenfeld, 1983; Stuber et al., 1999).

If possible, students should be given the opportunity to experience larger, regional conferences. With this exposure, students' views, expectations, or perceptions of the field of psychology may be substantially broadened. Regional undergraduate conferences are larger than local conferences in attendance and scope of subjects. They offer an opportunity for students from multiple institutions to come together and exchange ideas and information. This conference format usually offers a choice of oral presentations, posters, and symposia formats and may involve both graduate and undergraduate students. Regional undergraduate conferences, such as the 2-day Great Plains Students' Psychology Convention, involve participants from colleges and universities from several states, and have multiple sessions occurring simultaneously. Regional psychological organizations, such as the Midwestern Psychological Association (MPA), provide time and space in their programs for a "conference within a conference." An example of this would be the Psi Chi convention for the midwestern region, which is held annually at MPA. In the case of regional conventions, students may be required to have membership in a specific organization, such as Psi Chi or the hosting association, in order to be eligible to submit or present their research.

National conferences offer an even wider exposure of students to different schools and research methods. For example, the Psi Chi National Convention, held in conjunction with APS (Association for Psychological Science), offers tremendous opportunities to foster undergraduates' professional development. National conferences offer the same presentation formats as regional conferences, and also tend to add to the available options by planning workshops and panel discussions on varying topics, as well as receptions or hospitality suites where students can interact with students from other institutions, and even well-known researchers in the field. It should be noted that regional and national conventions include presentations from all levels of education, from undergraduate to practicing professionals. Generally, the review process for national conferences may be somewhat more rigorous than for local or regional conferences. Students who have papers or posters accepted at national conventions can be assured that their works adhere to the highest standards.

Asynchronous, or online conventions, such as *BEYOND eConferences*, are a relatively new type of conference that takes advantage of the power of the Internet to bring together researchers who are restricted by geographical, financial, or time limitations. Students submit manuscripts, or post multimedia presentations and downloadable handouts for viewing at the convenience of "attendees." Discussion boards are made available for attendees to post questions or comments. This format is especially beneficial for beginning presenters, as it allows them time to formulate comprehensive answers to questions, and also removes the performance pressure of a real-time event (Mandernach, 2006).

## Confronting Barriers

Faculty who realize the advantages that conference participation offers to themselves and their students may encounter institutional barriers to involvement in conference activities. A primary problem that interested faculty may come across is a campus culture that is not informed as to the benefits of conference participation. At colleges that are not overtly supportive of conference activities, individuals or small groups of interested faculty can arrange "mini conferences" or a "Psychology Day," where students can present their research to peers in a safe and more familiar environment. Faculty from smaller psychology departments may also invite neighboring two- and four-year schools to combine their resources and host a "mini" conference, such as those involved in the Southern California Psychology Conference (Stuber-McEwen et al., 1999). This type of activity addresses both common barriers of limited institutional support and limited faculty experience by downsizing the effort and financial outlay of the institution, while providing a "training ground" for those students and faculty mentors interested in presenting at larger conferences.

Another barrier to conference involvement may include student reluctance, lack of motivation, or environmental factors that affect the students' ability to participate (Stuber, 1986). These obstacles occur quite frequently, but can generally be overcome with open dialogue and utilization of institutional or organizational resources. Student reluctance may manifest because of an erroneous assumption that conference participation is unnecessary if the student plans to enter the work force after completion of the baccalaureate degree. It is very important to communicate with these students how conference presentations can translate into their careers through increased public speaking and organizational skills.

There are many ways to foster the desired motivation in reluctant students, such as creating a "conference course" for credit. Levine (2000) writes about a successful experience creating a specialized course to encourage conference participation by students. The course goals and objectives were: the acquisition of knowledge in a content area of psychology, demonstration of communication and observation skills, and the realization that professional development and learning are lifelong processes. The course requirements consisted of written assignments detailing the presentations attended and a final inclusive paper over the conference as a whole, as well as meetings and attendance points for pre- and post-convention processing. Class discussion was monitored to evaluate communication skills, with the final paper being "the primary mechanism to evaluate the degree to which the course goals are met" (pp. 208-209).

The availability of extra credit points in established psychology courses for attendance or presentations may be especially useful when dealing with indifferent students, as it affords them the chance to make up missed class points or dismal test grades, while possibly finding an area of interest and engagement outside of the classroom.

Environmental factors, such as time limitations or cost of travel and lodging, can be addressed utilizing advance planning or financial assistance from campus entities. Preplanning and fundraising through Psi Chi and Psi Beta chapters, or Psychology Clubs may be necessary. Even undergraduates should have the "opportunity to gain at least some insight into and appreciation of the skills involved in psychological research" (Palladino, Carsrud, Hulicka, & Benjamin, 1982, p. 71).

## In Closing

In *Field of Dreams*, a young farmer justifies his transformation of a section of cornfield into baseball diamond with the words, "If you build it, they will come." The dynamics of student engagement work the same way (Kuh et al., 2004). "That is, if faculty members systematically use effective educational practices, students will engage in them and benefit in desired ways" (p. 30). As faculty we are obligated to prepare students to meet the complex challenges that will one day face them, and to give them the research foundation that will prove "personally empowering, intellectually challenging, beneficial to civic society, and eminently useful" (AAC&U, 2002, as cited in Kuh, et al., 2004, p. 26). Encouraging students to attend and present at conferences is not only considered an effective educational practice, but from a practical standpoint is *as important* to professional development as the clinical field experience. The multifaceted benefits that conference participation offers to students, faculty, and the profession of psychology as a whole are inimitable through other undergraduate educational experiences, and truly serve the purpose of student and professional enrichment.

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# Posters on the Hill: A Unique Way to Present Undergraduate Research

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A rather unique place to have undergraduate students present their research is on Capitol Hill. Every year, since 1998, the Council on Undergraduate Research (CUR) invites undergraduate students from around the country to submit abstracts for the annual "Posters on the Hill" (POH) session in Washington D.C. Qualified faculty judges review over 400 proposals each year. Through a competitive process, these judges select 60 to 80 undergraduate research posters for the event. Between 2003 and 2006 undergraduate scholars presented a total of 250 posters representing each of CUR's divisions (Biology, Chemistry, Geosciences, Mathematics/Computer Science, Physics/Astronomy, Psychology, and Social Sciences). Traditionally, Biology and Chemistry are most represented with 30% and 20% of the posters respectively. Of the total number of projects presented during these years, 31 (12.4%) represented studies in Psychology. The number of psychology posters presented at the POH event has steadily increased from 9% of all posters in 2003, to 15% in 2006. This event is one way CUR encourages and supports building a culture of undergraduate research.

Founded in 1978, CUR is a national organization that promotes and supports high-quality undergraduate student-faculty collaborative research and scholarship. CUR's main focus is undergraduate research in natural and social sciences, and in mathematics education, but it also provides for faculty development and assists administrators with assessing research in their institutions. CUR works with federal agencies, and local organizations to develop research-based educational opportunities in primarily undergraduate institutions (PUI).

The literature contains multiple references of the benefits to students who engage in research. McKeachie and Milholland (1961) suggested that through conducting research projects students may gain an appreciation of research and scientific method, they may improve their knowledge of methodology, they may develop important research skills, they may experience enhanced critical thinking, and they get first hand experience with the process of knowledge generation or discovery. Elmes (2002) identified four important student outcomes associated with doing scientific research: (a) a higher level of student engagement, (b) enhanced intellectual achievement in psychology, (c) better research performance, and (d) highly desirable skills for doctoral programs and employers. Undergraduate research experiences also serve to help the student develop good writing, speaking, and reading skills (Wolfe, Reynolds, & Krantz, 2002). Students learn that not understanding something can be exciting. The Poster's on the Hill event may inspire some students to do research projects who may not have taken advantage of this type of educational experience.

The annual POH event takes place in April when congress is in session. Selected students invite the Senators and Representatives of their respective states to attend the poster session. CUR in turn invites the Washington press corps, federal funding agency program officers, and scientific leaders. Before students arrive in Washington, they write letters to Congress asking their representatives to support initiatives that promote the importance of undergraduate research and programs that fund these activities. Students demonstrate the value of undergraduate research by talking about their own research experiences to policy makers. For government agencies to continue support undergraduate research, policy makers must understand how the funding promotes basic and applied knowledge and how science and science education informs policy making. Since only a handful of members of congress are scientists, it can be a challenge for students and their mentors to clearly articulate their research findings in the context of policy making. But this venue provides the opportunity.

Students apply for a spot in this prestigious conference by applying on-line at www.cur.org. Along with an abstract, students submit a short resume and a statement of their career aspirations along with information about grants or fellowships that supported their research. Faculty advisors also

submit a letter of recommendation supporting the student's work. The deadline for applications is in mid November and notification of acceptance or rejection is made via email in mid February.

One goal of the Posters on the Hill conference is to thank the senators and representatives for their support, particularly if the research project was funded by a federal grant. While visiting the senators and representatives, students have an opportunity to describe the relevance of their research to the scientific body of knowledge or to addressing a problem of interest to modern society. It also allows students to highlight the process of doing research and how it may have influenced their career choices. This dialogue allows students to demonstrate the effectiveness of a more hands-on approach to education. As the Committee on Undergraduate Science Education (1997) noted:

> It is hard to imagine learning to do science, or learning about science, without doing laboratory of fieldwork. Experimentation underlies all scientific knowledge and understanding. Laboratories are wonderful setting for teaching and learning science. They provide students with opportunities to think about, discuss, and solve real problems (p. 16).

Once students receive a notification of acceptance from CUR, they begin preparing for the event immediately. During the lead up to the event, students also have a chance to learn many additional lessons in professional conduct. The successful undergraduates contact the senators and representatives from their home states and the states where their academic institutions are located. They schedule brief individual appointments in these representatives' Washington, D.C. offices. Many of these officials have schedulers who can set up meetings or students may get to negotiate an automated response system. The students also send and/or fax letters to each representative and senator (sample letters are available on-line (http://www.cur.org/postersession.html) thanking her/him for their support, calling for more funding and support be devoted to undergraduate research, and inviting her/him to the event. Students make hotel accommodations, registration information, flight schedules, and take care of other transportation needs. If the institution provides funding for student travel, students solicit those funds. Students also need to check the CUR web-site for logistical details and changes in presentation rules that change from time to time (i.e., poster size). Students' preparation for the event can be a great learning experience; the event itself is a rewarding experience as well.

## An Overview of the Posters on the Hill Day

The day starts with a breakfast in the Rayburn Building early in the morning. At the breakfast, students typically meet a member of congress or a congressional aide who talks about the importance of integrating undergraduate research and policy making. After breakfast, students and their faculty mentors visit the congressional offices. Besides meeting with state representatives, the visit may also involve a photo-op with some of the members of congress. Students and faculty advisors often receive a portrait with their representative free of charge. It is during these visits that students get a chance to communicate and discuss their research findings and what undergraduate research means to them. Because there are relatively few traditional scientists on Capitol Hill, students gain experience communicating their studies and findings in terms that individuals with a non-science background can understand.

Students often find this interaction time with their elected representatives a highly rewarding part of the event. Jordan Winter (medical student), a POH presenter in 2005 notes "Talking to our congressmen and senators on an individual basis about our research and the future of research assistance at both a state and national level, was an eye opening, unforgettable experience." Brandi McCulloch (psychology graduate student), presenter in 2002 noted that "the memory that stands out the most was being able to meet the senator of South Dakota at the time, Tom Daschle, who was also at the time of my visit, the Senate Majority Leader." Leah Skovran (psychology graduate student), presenter in 2006 believes that "POH has the opportunity to open doors and spur intellectual, one-on-one discussion with our nation's leaders, while at the same time making them aware of the impressive undergraduate research being produced by students nationwide." Similarly, Judith Flichtbeil (psychology graduate student) who presented in 2005 remembers "running around to various senators' offices to meet with either them or a representative and being taken seriously regarding what I had to say. It was one of the first times where I really felt as though I was being taken seriously in a professional setting by individuals who could put into practice what I had to say." Student presenter in 2006, Ryan McDonough (medical student) notes that "meeting with elected officials demanded that the real-world application for the results of my experiment be considered and applied." Mallory Henninger presented in April 2007 (current undergraduate student) and comments that "meeting with my state senators and congressmen was

particularly enlightening. Discussing psychological issues with politicians really teaches you how psychological research can be applied to the broader spectrum of health policy."

Around 4 p.m. students return to the Rayburn Building to set up their posters. It is during this poster presentation that students may glean some initial awareness of the incredible diversity and high level research that is being conducted by fellow students at American universities. It is also during this poster session that they become aware of the unique opportunity that they have been afforded. The majority of the audience is composed of representatives from funding agencies, the press corps, professional institutions, and members of congressional offices. Leah Skovran (psychology graduate student) presented her research in 2006 and noted:

> The aspect about POH that stood out for me the most was the outstanding array of sophisticated research that goes on in our nation's universities every day! I am certainly not fluent in biological concepts, but to speak with others who felt so strongly about their subject perked my interest in their passion.

Hilary Moores-Harper (farmer) who presented in 2005 noted that "not only was the quality of work done by fellow students impressive, but the level of interest we were shown by our colleagues was also. My involvement in POH granted me the unique opportunity to feel as though for one day at least, that I had made a difference as I represented my fellow undergraduate researchers." "In light of worries about a science gap between the U.S. and the rest of the world, I was impressed by the quality of research performed by America's next generation of scientific researchers" notes Jariel Rendell (AmeriCorp Volunteer), presenter in 2006. Mallory Henninger (current undergraduate student) who presented in 2007 noted that "presenting psychological research in an arena with many students from the more traditional hard sciences was also a good learning experience. Not only did I gain much scientific knowledge from the posters of others, but I got a chance to defend the empirical nature of psychological research." The poster presentation is the culmination of the hard work that students and their faculty mentors have put into their research, often times, for many years. After the two hour presentation and hors-d'oeuvres sponsored by CUR, students and mentors typically have dinner out in the town and return to their home institutions the following day.

## Students' Testimonials

Over the past six years, I have sponsored 14 students (7 posters) at the POH. I asked the alumni to reflect on their experiences and here is a summary of what some of them had to say. Judith Flichtbeil (psychology graduate student) who presented her research in 2004 remembers:

> POH gave me even more confidence to speak in front of people and gave me the feeling I can make a difference through research. Now, going into a field where I will most likely have to interact with politicians and other government officials, POH gave me some great experience to get started, not only in what to present, but in how to present to this specific population.

Hilary Moores-Harper (farmer) who presented a poster in 2005 has this message to prospective presenters:

> Of all of the undergraduate research symposiums and conferences I had the pleasure of attending, the POH conference was certainly the best. I believe that the most important lesson I learned was that there will be moments, and literally moments in life where you may have the opportunity to make monumental differences in people's lives, whether it be with undergraduate researchers, public policy, etc.

Another message that several graduates echo is:

> My experience at POH both broadened my understanding of the American political system and strengthened my beliefs in the importance of undergraduate research. Based on my experience at POH, I believe that expanding research opportunities for undergraduate and even high school students is one way to keep America at the cutting edge of science and technology (Jariel Rendell, AmeriCorps Volunteer, 2006).

Ryan McDonough (medical student), who presented research with Jariel Rendell in 2006, notes that:

> There are not many students who are given an opportunity to not only present their research on a national level, but to also advocate for the importance of undergraduate research funding. This is an aspect of research that can be frequently overlooked when the results are developed for the sole purpose of a grade. The entire process of developing an experiment from conception to completion was a learning experience in itself.

Now an attorney, Kate Rudersdorf was one of the first three students who came to Washington D.C. with me in 2002. Here are her words of reflection:

> POH helped transition me, the undergraduate student into a professional environment of research and presentations. Our psychology research was just as important as the cellular biology research and it seemed that more people were interested in our psychology research than other scientific fields!

Brandi McCulloch who traveled with Kate Rudersdorf stated that:

> Above and beyond all else, the experience I received from doing and assisting with research as an undergraduate student is what has benefited me the most during my time as a graduate student in an experimental program. Posters on the Hill is unique in that it gives experience in presenting research and it also gives an opportunity to present important findings to state officials, who have a very important relationship with the public.

This unique forum has contributed to building a culture of undergraduate research throughout the institution and has provided Creighton University with a national reputation for excellence in undergraduate research. The university was ranked by *US News and World Reports* (2005) as one of the top 65 institutions nationwide for its involvement of undergraduates in research. The fact that CUR sends press releases to each institution and local newspaper to highlight the importance of undergraduate research may have contributed to the rankings. In addition, the institution's alumni magazine (Creighton Magazine, Summer 2006) featured a picture and story of the event. This acknowledgment has led alumni to donate funds to set up summer research fellowships for undergraduate students and faculty mentors. Funding opportunities play an important role in motivating faculty and students to apply for these grants. At an administrative level, the dean of the college of arts and sciences has put aside travel funds specifically earmarked for POH, fully sponsoring faculty and students who are selected. The sponsored students are often asked to present their work as a featured talk to faculty, staff, students, and administrators of the university, providing an additional opportunity for them to practice their speaking skills and showcase their project. Based on my experience with POH, I instituted a research requirement in the major for each honor student, and created an annual "honors day" where students of the honors program present their research to the Creighton University community. This event has been so successful in the three years of its existence, that the administration is contemplating instituting an "undergraduate research day" where all undergraduate students can highlight their projects.

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# Undergraduate Research at Professional Psychology Conventions

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One of the most important aspects of undergraduate research is the opportunity to present or publish the research. For an undergraduate in psychology, there are a number of forums available to present or publish research findings. In this volume, Stuber-McEwen and Thielen-Belveal (2008) described undergraduate research conferences which specifically focus on student research while Ware and Burns (2008) and Froman (2008) discussed publication opportunities for undergraduate research. In this paper, the focus will be on the presentation of undergraduate research at professional conventions with particular attention given to the regional psychological associations.

## Professional Associations

As a profession, psychology has a strong history of supporting the undergraduate research experience. That support is most evident in the regional professional associations. A recent report from the American Psychological Association (Mathie & Wesp, 2006) highlighted the activities of regional associations in both secondary and post-secondary education including undergraduate research. There are seven regional psychological associations all of which have some provisions for the presentation of undergraduate research. The seven regional associations and their websites are as follows: Eastern Psychological Association (EPA, www.easternpsychological.org); Midwestern Psychological Association (MPA, www.midwesternpsych.org); New England Psychological Association (NEPA, http://www.nepa-info.org); Rocky Mountain Psychological Association (RMPA, www.rockymountainpsych.org); Southeastern Psychological Association (SEPA, www.sepaonline.com); Southwestern Psychological Association (SWPA, www.swpsych.org); and Western Psychological Association (WPA, www.westernpsych.org). Except for MPA, all of these associations allow undergraduates to become student members and present papers at their convention. MPA does not have provisions for undergraduate membership but will allow undergraduates to present at their convention if they are sponsored by a member. Requirements for student membership vary but generally student members require sponsorship from a full member, are non-voting, and have a reduced dues rate. The two national psychological associations, the American Psychological Association (APA, www.apa.org) and the Association for Psychological Science (APS, www.psychologica science.org), both have an undergraduate student membership category and programs at their conventions in support of undergraduate research. In addition to the national and regional associations, psychology has numerous discipline-specific professional organizations many of which also have provisions for undergraduates but most often require some level of professional sponsorship from the student's advisor.

For the undergraduate, there are a number of fundamental differences between presenting at an undergraduate conference and a professional convention. Stuber-McEwen and Thielen-Belveal (2008) outlined many of the important benefits of an undergraduate conference, but a professional convention provides a rather different experience with different benefits. First, an important distinction needs to be made. There are two ways in which a student can present at a regional professional convention. The first is through the *Psi Chi* program which is part of each regional convention. This is "the conference within the conference" and closely parallels the undergraduate conference model. Sessions are exclusively student sessions and often these papers are judged and awards are made. The primary audience for these sessions is fellow students and faculty advisors. More recently, however, we are seeing more undergraduate papers appearing among the regular paper sessions within some of the regional conventions that may be co-authored by faculty but presented by students. The primary audience for these sessions is other professionals and while they are not judged, they are scrutinized and held to a higher standard. While the *Psi Chi* programs are excellent opportunities and derive many of the

benefits of the regional convention, it is the latter situation that is of primary concern in this paper.

Undergraduate psychology conferences tend to have very low to non-existent rejection rates and work that has not been fully completed prior to submission is often accepted. Submissions to professional conventions, on the other hand, are reviewed more rigorously and have significant rejection rates. Often the primary focus of the undergraduate conference is to encourage learning about the process of doing research to help mold future researchers whereas at the professional convention the focus is on the content and the quality of the research. Dissemination of cutting-edge research is paramount at professional conventions and researchers use conventions to bridge the publication lags (Tryon, 1985).

## Benefits

There are obvious benefits for undergraduates to attend and present at professional conventions over student conferences. First, regional professional conventions tend to be more prestigious than student conferences. Just as there is a hierarchy of journals, there is a hierarchy of conventions and conferences. If a student is trying to build his or her resume for graduate school, a regional convention is generally viewed more positively. Second, students attending a professional convention have an opportunity to observe and model professionals at work. While students have interacted with faculty members in the classroom and in the lab, the professional convention presents a whole new situation and an opportunity to see professionals interacting with other professionals. In addition, the opportunity for a student to interact with their mentor "away from the office" can broaden their perspective about what it means to be a psychologist. Third, at most student conferences there is a single keynote address from a professional. At regional conventions there are many invited addresses, keynote speakers, and special lecturers from various sub-disciplines within psychology. Whenever I've taken undergraduates to a convention, the most memorable experiences are not what they themselves presented but instead what they heard from one of the keynote speakers. The opportunity for students to hear and meet psychologists that they have read about in their textbooks can be invigorating. Some of the regional conventions provide conversation hours or receptions that allow students access to these professionals. Fourth, regional conventions often present cutting-edge research by experts in the field. There is probably no better place to get timely information than at a convention. And finally, fifth, there are greater opportunities to network with professionals at regional conventions for both graduate school and research purposes. Contacts at conventions have propelled many students into graduate programs. Being able to put a face to an application or hearing a presentation by the applicant is invaluable when graduate programs are making decisions.

## Costs/Risks

There are also potential costs/risks involved in attending and presenting at professional conventions over student conferences. First, most student conferences strive to keep cost down and travel distance at a minimum. Professional conventions, on the other hand, can be quite expensive. Registration and membership fees are generally lower for students but still somewhat expensive. Hundred dollar a night hotel rooms are common place and most professional conventions last several days while student conferences are usually one or two days at the most. Travel as well as meal costs are also expensive. At one of the student conferences I've been involved with we charge students about $17 which includes a luncheon and evening banquet. At some convention hotels $17 won't cover breakfast. There are ways that students might have the opportunity to attend professional conventions at reduced costs. Most professional conventions utilize student volunteers to help out with registration or other tasks in exchange for the opportunity to attend some of the sessions.

A second concern or risk associated with a professional convention has to do with the level of support. One of the hallmarks of most undergraduate conferences is that they provide a very supportive environment of both peers and faculty that provide constructive feedback. That is not always the case at professional conventions. Not all the attendees at professional conventions are student-focused; sad to say, some are not even people-focused, and there is the occasional pompous professional we've all run into at conventions. A supportive environment is important for students who are just beginning their career in psychology. I still recall being brushed off by a researcher I greatly admired at a professional convention. But I equally recall convention experiences with some giants in the field who were as open and friendly as can be.

## Responsibilities

There are certain expectations of behavior at professional conventions that may not be apparent to the undergraduate student. Since failure to live up to those expectations reflects poorly not only to the

student but also on the faculty member and the institution they represent, it is the responsibility of the mentor/advisor/sponsor to communicate these expectations. The undergraduate needs to dress and act professionally. Jeans and a t-shirt or hopping from the hotel swimming pool into a paper session in your swim suit is never appropriate (I've seen both done at conventions). Entering sessions late or leaving sessions early is frowned upon. Some of the regional associations, such as WPA, post a guide for students attending conventions on their website. Others, like RMPA, include a section on convention etiquette in their program. A faculty mentor needs to discuss these issues before leaving for the convention because it is not always clear to the students what those expectations are. Often faculty assume that students know what it means to act professionally; that may be a faulty assumption.

While preparation is important at both the student and professional convention, the professional forum provides a more intense experience with greater risks. For the undergraduate, the audience is not one's peers, but rather possible future professors, colleagues whose impression could impact on the student's career. Most of us can recall the first paper we presented at a professional convention and the time we agonized over it. Most of us were probably graduate students, not undergrads, at the time. It is very important for the mentor to guide the undergraduate in this process especially since the mentor's name is typically on the paper. A well rehearsed presentation with note cards is far superior to the student who thought they could "wing it" and suddenly drew a blank.

## Closing Thoughts

As one who has been involved with both undergraduate conferences and professional conventions for a number of years, I would like to close with some suggestions. In a perfect world, every student in psychology would have the opportunity to present at both a student conference and a professional convention during their undergraduate career. While there are many undergraduate conferences around, they're still not everywhere. I believe that the student conference presents an ideal environment for presenting that first paper. It is supportive, typically provides constructive feedback, and is relatively non-threatening (when compared to the professional convention). Undergraduates who successfully present papers at the student conference level and who want to pursue further studies in psychology should be encouraged to take the next step and attend a professional convention even if they do not present a paper.

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# The Use of Locally Published Journals to Encourage Undergraduate Research

Richard L. Froman

***John Brown University***

In recent years, the principle of authentic assessment has revolutionized the practice of educational assessment. In brief, authentic assessments incorporate assignments that confront students with a real world task that is required of an educated person or a professional in the relevant field (Wiggins, 1993). Because it taps in to most of the educational objectives and goals of a Research Methods class, a comprehensive research paper may serve as an artifact of mastery, or as an authentic assessment of this type of course. A well-executed research project can demonstrate mastery of research and writing skills, the processes of data collection and analysis, and the critical thinking required for a proper interpretation of research. However, such assignments can also be interpreted by students and faculty alike as little more than an academic exercise with little relevance beyond the classroom.

The question is how to redesign the Research Methods project as an authentic assessment that has practical value beyond simply fulfilling a class assignment. One approach is to encourage selected students to publish their research in a journal that accepts research done by undergraduates. There are a number of such publications discussed in the following chapter. Another approach is to take the research project a step beyond the usual class term paper and create a locally-published periodical modeled after a professional peer-reviewed journal. A number of institutions have taken a variety of approaches to developing a locally-published undergraduate research journal (see Table 1).

The possibility of publication encourages a higher level of performance by rewarding excellence in scholarship with publication. It can also provide students with an authentic simulation of the entire publication process as experienced by professionals in the field from designing and conducting research, to writing and submitting an article and experiencing the peer review process. The possibility of publication can also excite students about conducting research, especially as they read research completed by other undergraduates from their institution. It also provides students with examples of quality research done by their peers which gives them a standard that is perceived as simultaneously excellent and attainable.

Unlike the journals that cater to regional, national, or international undergraduate research projects, this chapter explores locally published journals that typically accept work for publication from their institution only. The publication processes developed at these institutions tend to be idiosyncratic to local needs and desires. This ensures the availability of a workable model for just about any institution that would like to start such a publication. For those interested in investigating the process further, Table 1 provides contact information for institutions who have successfully instituted locally published journals. The contacts at each institution listed in the table responded to my request for information and all were helpful and eager to discuss the process of publication. All of these contacts would be excellent resources for anyone interested in learning from their experiences.

## Type of Sponsoring Programs

Sponsorship of institutional journals varies greatly by institution. Some, such as the one published by the McNair Scholars Program at Penn State University (and many other McNair programs around the country), are housed in a particular program within the school. The McNair program requires dissemination of student research so most programs have some form of a student research journal. Some journals are published through the institutions' Office of Undergraduate Research and publish research from a variety of majors. Others are published by the Psychology Department at the college and limit submissions to Psychology majors from their department.

| **Journal**<br>**Institution**<br>**Contacts, e-mail**<br>**URL** | **Psychology Only** | **Submission method** | **Editor** | **Reviewers** | **Publication Form** |
|---|---|---|---|---|---|
| *WUURD (Washington University Undergraduate Research Digest)*<br>Washington U - St. Louis<br>Joy Zalis Kiefer, Kristin Sobotka, research@artsci.wustl.edu<br>http://ur.wustl.edu/digest/ | N | paper | Staff | Faculty | Paper<br>Online |
| *Journal of Undergraduate Research*<br>U North Carolina – Asheville<br>Mark Harvey, mharvey@unca.edu<br>http://www.unca.edu/urp/Journalinfo.html | N | paper | Staff | Faculty | CD |
| *Endeavor*<br>U Wisconsin - River Falls<br>Bill Campbell, wm.e.campbell@uwrf.edu<br>http://www.uwrf.edu/endeavor/ | N | Online<br>paper | Staff | Faculty | Online |
| *Undergraduate Research Journal*<br>U Nebraska – Kearney<br>John Falconer, falconerj@unk.edu<br>http://www.unk.edu/acad/gradstudies/ugr/index.php?id=5442 | N | paper | Staff<br>Student | Faculty | Paper |
| *Gardner-Webb Review*<br>Gardner-Webb U<br>Chris Davis, cdavis@gardner-webb.edu | N | paper | Faculty | Board | Paper |
| *The Undergraduate Research in Psychology and Behavioral Science Journal*<br>U West Florida<br>Steve Kass, skass@uwf.edu<br>http://uwf.edu/argojournal/home/ | Y | Online | Faculty<br>Student | Student | Paper<br>Online |
| *Oshkosh Scholar*<br>U Wisconsin Oshkosh<br>Susan Surendonk, surendon@uwosh.edu<br>http://minds.wisconsin.edu/handle/1793/6650 | N | e-mail | Faculty<br>Student | Faculty | Paper<br>Online |
| *Columbia Undergraduate Science Journal*<br>Columbia U<br>Gabriel Morris, cusj@columbia.edu<br>http://cusj.columbia.edu/ | N | Online | Student | Faculty<br>Student | Online |
| *The McNair Journal*<br>Penn State U<br>Teresa Tassotti, txt6@psu.edu<br>http://www.gradsch.psu.edu/diversity/mcnair_jrnl2006/open.html | N | Online | Staff | Staff | Online |
| *Initial Forays into Psychological Science*<br>John Brown U<br>Rick Froman, rfroman@jbu.edu<br>http://acadweb.jbu.edu/psychology/IFPS/IFPS.htm | Y | e-mail | Faculty | Student | Online |
| *UW-Lacrosse Journal of Undergraduate Research*<br>U Wisconsin – LaCrosse<br>Aaron Monte, monte.aaro@uwlax.edu<br>http://www.uwlax.edu/urc/JUR-online/ | N | Paper<br>e-mail | Faculty | Faculty | Online<br>CD |
| *The New School Psychology Bulletin*<br>The New School for Social Research<br>Daniel Antonius, Antonius@nspb.net<br>http://www.nspb.net | Y | Paper<br>e-mail | Student | Student | Paper |
| *Berkeley Undergraduate Journal*<br>U Cal Berkeley<br>Leah Carroll, haas_scholars@learning.berkeley.edu<br>http://learning.berkeley.edu/buj/ | N | Paper<br>e-mail | Student | Student | Paper |

## Curricular Integration

All of the surveyed journals, except one, were published as an extracurricular activity. Only John Brown University publishes the journal as a part of the Psychology Department curriculum for students at varying points in their undergraduate experience. At this institution, research articles are submitted for consideration by members of the lower division Research Methods class. The upper division Research Seminar class acts as the peer review board (using a detailed rubric) to advise the faculty editor about which articles will be published. The instructor of the Research Seminar acts as the editor and makes final decisions on which submissions will be published based on the peer reviews of members of the class. The circle is complete when the published journal is used by students in the following year's Research Methods class to model research for various class assignments.

## Processing Submissions

Locally-published institutional journals have various policies on who can submit research for publication. Departmentally-published journals generally limit submissions to students in the department. Journals sponsored by an inter-disciplinary office of undergraduate research, usually allow students to publish research from a variety of disciplines. Some institutional publications are not limited to research articles and also encourage other types of scholarly and even creative submissions.

Journals also vary in how submissions are processed. Some require a paper submission while others have some form of e-mail or online submissions. The editor is usually a faculty member working with faculty reviewers but some publications have student editors and reviewers. Some departments involve graduate students in the publication process and some have student assistant editors. Again, each institution may adopt a process that best meets its needs.

## Circulation Models

Visible circulation of the journal is a crucial aspect of the publication experience. The two most common modes of circulation are local distribution within the college in a paper format and online distribution from the college's web site; each method has advantages and disadvantages. The advantages of a paper format include the possible perception that a paper publication is somehow more prestigious. In addition, paper journals are more portable and can be perused without the use of a computer. However, a paper journal will have additional publication costs that will have to be borne either by the readers, a grant, a sponsoring program, the department or some combination of the above. Online publications include minimal publication costs, freedom from bookstore or other distribution outlets and wider potential dissemination. Of course, the online format also requires some technical skill and the willingness of the college to make web space available on their institutional web site.

## Faculty Involvement

One of the major considerations in developing an institutional journal is sustaining the effort from year to year. As student interest may wax and wane, institutional journals can sometimes vary in quality and activity from year to year. Moreover, student editors and reviewers tend to graduate and move on, leaving a void in leadership for the journal. To maintain more consistent quality and activity level, most locally published journals require substantial faculty involvement in the process. Whether faculty editors work in the Office of Undergraduate Research, in the Psychology department, or in other areas of the institution, it is safe to say that, without commitment from key faculty members, the journal will not last long. The amount and type of work done by individual faculty members can vary widely depending on the institutional model. Regardless of the particular model adopted, faculty involvement is invaluable in providing continuity.

## Challenges

Locally-published journals have a number of challenges in common and a variety of methods to address them. First, how will it be organized for sustainability? Although the educational nature of the project calls for the highest degree of student involvement, the continuation of the process calls for the stability of being housed in a department or other university program. At the least, it seems to require significant faculty involvement.

The second concern is the cost of the program. This can be borne by a sponsoring program office or a subscription or some combination of the two. Online publication of the journal is generally much less expensive than paper publication in terms of printing costs. Other production costs are controlled by using student or faculty volunteers or funded program officers to produce the journal.

The third concern is how to achieve quality control. An emphasis on the educational nature of the project would suggest the use of students for as many roles as possible in the publication process. However, a desire for continuity and quality will call for the use of faculty in, at least, a supervisory role in the process.

A fourth issue is the relationship between the journal and the departmental curriculum. Most institutions publish research produced by students as class projects; however, the journal is not usually published as a class project. While the challenges seem formidable, there are many successful examples of successful institutional journal programs. One such success has been found at John Brown University.

## Case Study of John Brown University

A unique response to the four challenges outlined above is illustrated by the institutional journal published within the Psychology Department at John Brown University. Its main uniqueness is that it is an annual class project in a required class within the Psychology curriculum. The journal serves as a required reference text for the next year's Research Methods course assignments. Because it is integrated into the curriculum, the project is inherently sustainable.

The cost issue was initially addressed at JBU by producing a paper journal and selling it through the bookstore to students with the rest of their texts. Student authors signed a release that allowed them to retain control of the copyright while limiting the price of the journal to the cost of reproduction. Initially, students purchased the text through the bookstore. However, due to incompatible business decisions and policy changes, this arrangement became too cumbersome and complex.

It soon became obvious that the best solution for all involved was to publish the journal online. Such a solution did not require bookstore involvement, it cost the Research Methods students nothing and it required the least amount of work to produce the journal. The online journal is produced by collecting the articles in electronic format, reformatting them from APA manuscript style to journal style, saving the final product in Adobe PDF format and posting it to the departmental website. There is the further advantage that, with each passing year, the archive of previous issues grows and Research Methods students have even more articles to choose from in completing their assignments. An additional advantage is that any errors found after publication can easily be fixed and the journal reposted.

To ensure quality control, the article review process is built into the syllabus of the upper division Research Seminar course. Small groups of students review all submitted articles based on criterion contained within a detailed rubric. They collectively decide on editorial comments that are forwarded to each author. Each student/peer reviewer also chooses an additional role to play in the review process. The first role is the small group secretary who communicates the group's comments to the professor/editor**.** The second role is the plagiarism detector which involves taking passages from the text of each article reviewed and doing an internet search to check for possible plagiarism. This person is also responsible to find some of the references listed in the article and compare the original work to the submitted text. This comparison focuses on appropriate paraphrasing and general content. A Reference Checker reviews all of the listed references for accuracy. Internet tools such as PsycINFO aid in this process. Finally an Abstract Checker does a PsycINFO search on the topic of the papers reviewed to determine if the author of the paper is actually giving a correct impression of the state of the current research as it relates to their hypothesis.

Although the faculty person is the editor of the journal and makes the final decision regarding which articles are accepted for publication, the weight of the review process is carried by the students in the class. The largest time commitment for the faculty is converting the documents from manuscript to publication style and creating the completed journal format. This part of the process is fairly tedious and could also be assigned to a work study student or administrative assistant and proofread by the editor. The publication process gives students in the Research Seminar class an authentic but condensed simulation of the journal publication process and a very in-depth understanding of APA style as they compare the student submissions to the evaluation rubric.

The specific model that is best for each institution depends on the size of the institution and whether the journal will be housed within the Psychology Department or in an interdisciplinary program office on campus. The experience of many institutions now confirms that the concept of an institutional journal is very flexible and adaptable to the needs of a variety of institutions and the educational advantages make the efforts to institute it and sustain it worthwhile.

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## Author Note

I thank each of the contact persons listed in Table 1 for their assistance in confirming the details of the publications at their institutions and their willingness to be contacted by readers of this chapter to guide them through the process of developing such a journal at their institutions.

# Undergraduate Student Research Journals: Opportunities for and Benefits from Publication

**Mark E. Ware**

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Recent years have witnessed an increased emphasis on scholarly development of undergraduate psychology students. Opportunities for presenting research include (a) end-of-class poster and paper presentations (Baird, 1991; Gore & Camp, 1987), (b) department or campus-wide paper reading and poster sessions (Rosenberg & Blount, 1988), (c) regional students' psychology conventions (e.g., Great Plains Students' Psychology Convention and ILLOWA), and (d) regional and national psychology conventions (e.g., Midwestern Psychological Association and Association for Psychological Science).

An extension of this scholarly development has been the pursuit of student research that results in a publication. The results from a study by Keith-Spiegel, Tabachnick, and Spiegel (1994) reflected the importance for such tangible accomplishments. They reported that research leading to a publication was the most important second-order criterion used for admission to graduate school.

With such emphasis on student research leading to publication, we were not surprised that psychology educators had established several journals devoted to the publication of student initiated research. Our search revealed several journals that published undergraduate students' research. Table 1 contains comparative information about eight journals. Several of the listed journals have a narrower geographical range of students from one or only a few institutions (e.g., *The Undergraduate Journal of Psychology: A Journal of the Psychology Department of the University of North Carolina at Charlotte* and the *UCLA Undergraduate Psychology Journal)*. Rick Froman examines several such journals in this book's previous chapter on "Institutional Journals."

One of the journals listed in Table 1 gives preference to Canadian students on interdisciplinary topics of cognitive science (*Canadian Undergraduate Journal of Cognitive Science*) and another accepts articles from disciplines beyond psychology, including biomedical research (*Undergraduate Research Journal for the Human Sciences*). Finally, one journal also accepts contributions from graduate students and faculty (*Journal of Psychology and Behavioral Sciences*). Thus, there are several and diverse sources for publication of student research.

The purpose of this chapter was to examine the characteristics and benefits of scholarly publication in three journals (i.e., *Journal of Psychological Inquiry (JPI), Modern Psychological Studies (MPS), and Psi Chi Journal of Undergraduate Research (PCJUR)*) whose primary goal is to publish the research of undergraduate students who come from a variety of institutions. The selection of these journals was not a criticism of the previously identified journals, but the intention of this chapter was to concentrate on a sharply defined group of publications.

Inspection of Table 1 reveals that all three journals were established in the early to mid 1990s. Two of the three journals (*JPI* and *PCJUR*) publish hard copies and make materials available online. *PCJUR* limits manuscripts to empirical research, and *MPS* has undergraduate student reviewers. Detailed information about eligibility for contributors and submission procedures is available on Web sites:

*JPI* http://jpi.morningside.edu/

*MPS* http://www.utc.edu/StudentOrgs/ ModernPsychologicalStudies/submit.html

*PSJUR* http://www.psichi.org/pubs/ journal/ submissions.asp)

**Table 1**

***Selective List of Journals That Publish Undergraduate Students' Research***

| Journal Title (first year of publication) | Publication Format | | Type of | Status of |
|---|---|---|---|---|
| | Hard copy | On-line | Manuscript | Reviewers |
| *Journal of Psychological Inquiry* (1996) | Y | Y | empirical studies, literature reviews, historical pieces, special features | faculty |
| *Modern Psychological Studies* (1993) | Y | N | experimental research, theoretical papers, literature reviews, and book reviews | undergraduate students |
| *Psi Chi Journal of Undergraduate Research* (1996) | Y | Y | empirical studies | faculty |
| *Journal of Psychological and Behavioral Sciences* (1966) | Y | Y | empirical studies and literature reviews | undergraduate and graduate students |
| *The Undergraduate Journal of Psychology: A Journal of the Psychology Department of the University of North Carolina at Charlotte* (1988) | N | Y | empirical studies and literature reviews | ? |
| *UCLA Undergraduate Psychology Journal(2002)* | N | Y | editorials, research articles, and UCLA professor biographies | undergraduate and graduate students |
| *Canadian Undergraduate Journal of Cognitive Science* (2002) | N | Y | empirical studies, literature reviews, interdisciplinary work of cognitive science | ? |
| *Undergraduate Research Journal for the Human Sciences* (2002) | N | Y | experiments, surveys, case studies, and documentary research | ? |

## Benefits

The literature identifies several benefits for students conducting research, including (a) promoting creativity and critical thinking skills (Addison, 1996; Hubbard & Ritchie, 1995), (b) encouraging collaborative learning, (c) refining communication skills (Dunn, 1996; Schapman, 1998), (d) developing enthusiasm for scholarly pursuits (Khersonskaya, 1998), and (e) developing feelings of competence and familiarity with the entire research process (Wolverton, 1998). Benefits for students submitting manuscripts for publication include the previously mentioned benefits for presenting research, as well as (a) refining formal written communication skills (Lawson & Smith, 1996; Peden, 1991), (b) obtaining feedback from independent reviewers, and (c) enjoying the prospect for formal recognition for excellence in scientific investigation (i.e., publication).

Brownlow (1997) elaborated on the practical and intrinsic rewards from students publishing their research. Among practical skills for students planning to attend graduate school, Brownlow emphasized basic research design, methodology, statistical procedures, and computer uses. Because most graduate programs require rigorous sophistication in empirical inquiry, evidence of scholarly publication indicates the willingness to, and the mettle for, doing research. Most prospective employers are eager to see demonstrable evidence that an individual can

think and communicate clearly. Additionally important is evidence that a prospective employee has demonstrated a "fortitude to tackle and complete difficulty tasks" (p. 84). Finally, Brownlow asserts that there is an intrinsic reward from publishing research. She points out that there is benefit in the pleasure in "knowledge for the sake of knowledge" (p. 84-85).

We present anecdotal reports from faculty about the advantages for students' involvement in research from mentoring and writing to preparing to enter the world of work.

## *Mentoring and Writing*

Professor A

> "One advantage that has emerged from my talks with former students, who are established in graduate programs, is that preparing a manuscript for *JPI* was the only writing task that realistically prepared them for the kind of writing/revision regime required to publish scientific articles. Moreover, the writing and editing that I have done with my students is so similar to what I would do with a colleague that it mirrors the real world of academic publication."

Professor B

> "The student has the rare opportunity to work closely with, and be mentored by, a faculty member. The student's writing skills will be improved. And let's not forget the benefits to the faculty member. The faculty member has the opportunity to work closely with, and mentor, a bright student. The faculty member feels a sense of accomplishment by having shepherded a student through the process."

## *Communication Skills for the World of Work*

> "Carol (fictitious) was only a "C" student, but her motivation and interest in research energized her through the whole process. She excelled in planning, conducting, and writing her research project. She presented her project orally at the Great Plains Convention. When she discovered the existence of *JPI*, her motivation prompted her to submit her paper for publication. When her paper was published, Carol was extremely proud. Carol is now a manager with a major Omaha bank. She is convinced that the process of her research project helped her get her present job by demonstrating writing and speaking skills."

The results of recent publications reinforce and extend those benefits for students. For example, Landrum and Nelsen (2002) conducted a national survey of undergraduate educators from the Council of Undergraduate Research Programs. Respondents rated the importance of each of 40 potential benefits, skills, and abilities to an undergraduate education. Results of factor analysis identified two major themes. The first factor contained items relating to technical skills, such as analyzing data, using statistical programs, preparing a manuscript, and developing questionnaires and surveys. The second factor included interpersonal benefits, including teamwork, leadership and time-management skills, self-confidence, and interpersonal communications skills.

There is evidence that positive results from student research activity can occur in conjunction with early participation. For example, Ishiyama (2002) examined the relationship between participation in undergraduate research among social science and humanities students. A sample of 156 students, who had declared social science or humanities majors, were participants; 27 of those students reported that they had participated in collaborative research with a faculty member. Students completed an inventory that assessed the degree to which they recognized gains in (a) thinking analytically and logically, (b) putting ideas together and noting similarities and differences between ideas, and (c) learning on their own, pursuing ideas and finding information they need to complete a task. Ishiyama reported significantly greater gains among students who had participated in collaborative research with faculty. Those gains were particularly beneficial for first-generations students.

Ordinarily, students pursue scholarly activity inside and outside the classroom with the instruction, direction, and support of their teachers. Are such faculty efforts only for the students' benefit? We contend that there are also benefits for faculty participation in student research. Schwebel and Tzanetos (2005) pointed out the advantages to faculty involving intensive laboratory experience with premedical psychology majors. Benefits to faculty included working with intelligent, motivated students with strong mathematical and scientific research skills, which enliven the research environment.

More generally, advantages to faculty include: (a) reinforcing and extending their own scholarly skills, (b) establishing and maintaining collegial contacts, (c) developing contacts with faculty from graduate programs in psychology, (d) initiating peer teaching and research collaboration, and (e) increasing motivation for teaching and scholarly

undertakings. Benefits for faculty involvement in student publication include (a) refining APA writing style, (b) improving writing skills, (c) enhancing knowledge and skills for teaching research, and (d) using published student research in the classroom to illustrate concepts and to model effective written communication.

## Summary and Conclusions

Encouraging and supporting students' participation in research and publications is congruent with developing and expanding their scholarly skills. There are several journals that appeal to local, regional, or national audiences of undergraduate psychology students. Specifically, we summarized characteristics and numerous benefits of scholarly publication in three journals (*JPI, MPS,* and *PCJUR)*. Our personal experience and the published literature indicate that faculty involvement in student scholarship is a win-win situation; students and faculty accrue numerous benefits from such interaction.

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# Section 7. Assessment and Evaluation

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# Science Undergraduates' Perceptions of Learning from Undergraduate Research Experiences

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In the last few years, undergraduate research experiences (UREs) have become an increasingly common component of undergraduate science curricula. However, researchers have only recently undertaken empirically-based assessments of the benefits that accrue to students participating in UREs (Bauer & Bennett, 2003; Hunter, Laursen, & Seymour, 2007; Kardash, 2000; Lopatto, 2004; Seymour, Hunter, Laursen & DeAntoni, 2004; Zydney, Bennett, Shahid, & Bauer, 2002). For example, based on their review of 54 published articles and reports that addressed how UREs presumably benefit the students who participate, Seymour et al. found only four research articles and five evaluations that, in their estimation, provided carefully documented evidence supporting the various authors' claims about the benefits of UREs.

Given Seymour et al.'s (2004) findings, it is clear that the degree to which the hypothesized benefits of UREs actually accrue to participating students remains largely unknown. In an attempt to shed some light on the benefits of UREs to both the students who engage in them and to their faculty mentors, Seymour and her colleagues (Seymour et al, 2004; Hunter et al., 2007) interviewed 76 students in eight science disciplines at four liberal arts institutions. Students commented on the extent to which they experienced 24 hypothesized benefits of UREs that Seymour et al. had identified in their literature review and indicated any other gains they had achieved that were not on Seymour et al.'s checklist. Seymour et al. classified the benefits and gains mentioned by students into seven categories. Students mentioned "personal and professional gains" and "thinking and working like a scientist" most frequently, with each category accounting for 28% of all gains mentioned by students. Categories of gains mentioned less frequently were gains in skills, clarification and confirmation of career/ education path, enhanced career/graduate school preparation, and changes in attitudes toward learning and working as a researcher.

We were unaware of Seymour et al.'s (2004) evaluation efforts when, in 1996, we began our evaluation of the effects of UREs on a variety of student outcomes, including student-identified benefits of participation in UREs. In fact, we found little in the way of published accounts of the effects of UREs that could guide our efforts. Because the literature on UREs that did exist at the time focused exclusively on the outcomes that faculty mentors and program directors expected participants would acquire, it seemed important to collect data regarding students' perceptions of the benefits associated with participation in UREs. The present chapter summarizes students' perceptions of what they considered to be the most important things they learned from their URE internship.

## Method

### *Description of the URE and Participants*

Participants in our evaluation efforts were undergraduate science students at the University of Missouri-Columbia, a research -extensive university. Monies from the National Science Foundation-Research Experiences for Undergraduates (NSF-REU) and the Howard Hughes Medical Institute (HHMI) provided support for UREs in biology, biochemistry, chemistry, mathematics, and physics. Students participated in theoretical, field, or laboratory research with faculty mentors in any of these disciplines during an 8-week summer session, or during the entire academic year. Students who participated in the summer URE worked 40 hours per week in their mentors' laboratories for an 8-week

period. Their URE culminated with poster presentations of their work on the university's campus. Students who participated in the academic-year URE worked 12 hours per week in their mentors' laboratories for a 32-week period. Their URE culminated with oral presentations of their research projects at a statewide science conference in the spring.

In the present study, we report data provided by 72 students from among a total sample of 189 students who participated in UREs during the time period from summer 1996 until summer 1999. The 189 juniors and seniors comprised 113 women (59.8%) and 76 men (40.2%). Of these 189 students, 146 (77.2%) received funding from HHMI and 43 (22.8%) from NSF-REU. One hundred seventy two students provided the following information regarding ethnicity: Caucasian (71.4%), African American (12.2 %), Asian Pacific Islander (5.3%), Native American (1.6%), and international (0.5%).

## *Materials and Procedures*

On the last day of their respective UREs, students responded in writing to several open-ended questions designed to elicit their overall perceptions of the research internship experiences. The specific questions asked at the end of each internship varied somewhat, with not all questions being asked each semester. We asked 107 students, "What are the most important things you learned from the internship?" We present below the responses of the 72 students who answered this question..

## *Scoring of Open-Ended Questions*

We first examined students' responses to each open-ended question for recurring responses and themes, and formed preliminary categories on that basis (Strauss & Corbin, 1998). The first and second authors coded all participant responses by assigning individual responses to the preliminary categories. We resolved disagreements between us by consensus, leading to successive refinements of the categories. We reduced the preliminary categories produced in response to each question by taking into account both the frequency with which certain responses fell into a particular category and also by a logical analysis of the similarity among the various categories (Berg, 1998).

Examination of responses to each question revealed that students frequently listed phrases or terms that they viewed as unique descriptors, but that we viewed as belonging to the same category. For example, one student wrote that the URE made him more "objective," "dispassionate," and "unbiased." Each of these terms fell into our "open-mindedness/objectivity" category. We designated all three terms with the same category number and counted them just once to eliminate redundancies that would otherwise produce spuriously high frequencies for that category.

# Results

## *Responses to Open-Ended Questions*

*What are the most important things you learned from the research internship?* Forty-four female and 28 male students responded to this item. Table 1 displays the categories of students' responses. Students mentioned most often the acquisition of scientific dispositions and habits of mind. Within this category, students emphasized the importance of patience, keeping focused, persisting, and maintaining a positive attitude in the face of long and difficult periods before realizing the gains of one's labor. They recognized that respecting and getting along with others is critical to the work of science, and that credit should be given to those who do the work. They noted that logistical planning and anticipating potential problems are key to accomplishing tasks efficiently. Interns expressed the importance of remaining dispassionate about one's results and accepting data that don't confirm one's hypotheses. They commented on the ability to self-motivate out of love for and commitment to the discipline. Such motivation and commitment included the need to stay current with technological advances and information in the discipline.

Roughly 50% of the students mentioned gains in research skills and insights into the research process and life of a research scientist. Within this category, students most often mentioned increases in their ability to think like a research scientist. This included a developing understanding of the nature of scientific truth and the means by which truth claims are validated, as well as a working knowledge of how to problem solve and conduct scientific experiments. Others simply mentioned research skills in general or learning about the lifestyle of scientists. Yet others mentioned an increase in their ability to effectively communicate their ideas using jargon appropriate to their field. Some students mentioned less positive gains.

**Table 1**

***Students' Perceptions of Most Important Things Learned from the URE***

| Categories | Percent of Students Mentioning Category |
|---|---|
| Gains in scientific dispositions and habits of mind | |
| Patience and focus | 19.4% |
| Persistence and perseverance | 13.9% |
| Teamwork | 11.1% |
| Organization and planning ahead | 8.3% |
| Objectivity, open-mindedness and skepticism | 6.9% |
| Motivation, dedication, and commitment | 5.6% |
| Lifelong learning and keeping up with advances in the field | 4.2% |
| Learning from mistakes and accepting setbacks | 2.8% |
| Attention to detail | 1.4% |
| Seeing the big picture and goal-oriented thinking | 1.4% |
| Honesty and ethical behavior | 1.4% |
| Time management | 1.4% |
| Total | 77.8% |
| Gains in research skills and insights into the research process | |
| Increased ability to think like a scientist | 12.5% |
| Increased research skills and experience | 11.1% |
| Increased insight into the unpredictability and frustration associated with the process of research | 8.3% |
| Increased communication skills | 8.3% |
| Increased appreciation for research and insight into the lifestyle of research scientists | 6.9% |
| Insight into monotonous and tedious nature of benchwork | 4.2% |
| Total | 51.4% |
| Gains in general knowledge and skills | |
| Content knowledge | 16.7% |
| Laboratory skills | 9.7% |
| Critical thinking and problem solving abilities | 9.7% |
| Making cross disciplinary connections and linking theory to real-life experiences | 4.2% |
| Total | 40.3% |
| Career clarification | |
| Provided information to aid in career decision-making | 20.8% |
| Increased likelihood of choosing a research science career | 6.9% |
| Decreased likelihood of choosing a research science career | 6.9% |
| Total | 34.7% |
| Gains in perceived self-efficacy and independence | |
| Perceived self-efficacy and pride in accomplishments | 13.9% |
| Think independently | 9.7% |
| Work independently | 1.4% |
| Total | 25.0% |

**Table 1 (continued)**

***Students' Perceptions of Most Important Things Learned from the URE***

| Categories | Percent of Students Mentioning Category |
|---|---|
| Personal and professional gains | |
| Sense of enjoyment, fun and passion | 11.1% |
| Collegial relationships with faculty and peers | 6.9% |
| Resume builder | 2.8% |
| Potential for publications | 2.8% |
| Total | 23.6% |
| Negative experiences and insights | |
| Learning about the pressure on faculty to write grants | 4.2% |
| Lack of administrative support for faculty | 4.2% |
| Long hours in the laboratory | 4.2% |
| Competitive colleagues | 2.8% |
| Not finishing research project due to problems with laboratory equipment | 1.4% |
| Problems with faculty mentor | 1.4% |
| Low pay | 1.4% |
| Learning about the pressure on faculty to publish | 1.4% |
| Total | 20.8% |

They commented on the frustration experienced when the results of their studies failed to support their hypotheses, or expressed frustration with the amount of repetitive and boring detail required by bench work.

Approximately 40% of the students mentioned significant gains in knowledge and skills as the most important learning outcomes of the URE. In this category, gains in content knowledge specific to a discipline were mentioned most frequently. Some students noted they were able to attach new meaning to previously learned information by seeing it applied in a research setting. Others stated that the experience enhanced their understanding of the interrelatedness of the various fields of science. Fewer students mentioned gains in laboratory skills and critical thinking and problem solving abilities.

Almost 35% of the students listed career clarification as the most important thing learned from the experience. Many indicated that some aspect of the research experience enabled them to think of a science career in a new or unanticipated way. Others indicated that the experience helped them to gain a clearer picture of what they desired from a career, especially a science career. Yet others viewed the experience as a means of trying out a science career before committing to it. For a small number of students, the experience was as likely to decrease as to increase their interest in a career in research science.

For 25% of the students, the internship resulted in substantial gains in perceived self-efficacy and in their self-reported ability to think independently. Several students commented on the pride they took in their accomplishments. Many expressed a willingness to tackle questions or problems with a new sense of confidence and boldness, as well as willingness to make a claim or take a stance and adhere to it. Yet others noted that the experience increased their sense of self-direction and personal responsibility.

About 24% of the students mentioned personal and professional gains. Several students referred to the sheer enjoyment and fun associated with conducting research. Other students viewed the development of collegial relationships, talking with others about science, and networking as important aspects. Only a few students viewed the program as a means of increasing their chances of getting into medical or graduate school.

Interestingly, almost 21% of the students listed negative experiences and insights as the most important things they had learned from the internship. As seen in Table 1, these insights covered a wide range of experiences. Some students commented on the amount of pressure placed on

faculty to write grants, and noted how this decreased their interest in a research science career. Others commented on the following barriers to conducting research and writing grants: lack of monetary support for faculty laboratories, administrators' requests for faculty to do things other than research, political or social issues that interfered with faculty's ability to conduct research, and lack of recognition for faculty's efforts. Similar numbers of students remarked on the long hours required by laboratory work and how that decreased their interest in a research science career.

## Discussion and Conclusions

Involvement of undergraduate students in meaningful research with faculty mentors is a powerful instructional tool. Among the outcomes that faculty expect students to acquire from UREs are the acquisition of knowledge, research skills, and the attitudes of scientists. How consistent are these faculty-identified hypothesized benefits of UREs with student-identified benefits? Our study and Seymour et al.'s (2004) study are among the first to address this question. Findings from both studies generally confirm the hypothesized benefits of UREs. Namely, participation in UREs confers the following benefits: increases in students' understanding of the processes and acquisition of the dispositions involved in scientific research; increases in students' general knowledge and understanding of science, and in their ability to apply that knowledge to research problems; increases in students' self-confidence in their ability to do research and to contribute meaningfully to the scientific enterprise; development of collegial and collaborative relationships with faculty mentors and others; and increases in communication skills, especially oral ones. In addition, data from both studies reveal that students tend to be very positive about their UREs. We are presently collecting longitudinal data to investigate whether these positive feelings result in participants eventually choosing research science careers. What is clear from both studies, however, is that UREs play an important role in clarifying interns' career-related thinking.

Other benefits, although mentioned, appeared with less frequency in both studies. These included increases in written communication skills, changes in students' views about the nature of scientific knowledge, and career-enhancing outcomes (e.g., a "resume builder"). It is noteworthy that only a relatively small percentage of students reported increases in the development of higher- order inquiry skills. The point is not that these skills were rarely achieved by participation in UREs Rather, the point is that improvements in these particular skills have been widely touted as hypothesized benefits from participation in UREs (Seymour et al., 2004). Data from both our study and Seymour et al.,on the other hand, indicate that the degree to which these skills are enhanced, at least compared to other student-identified benefits and gains, has been somewhat less than expected. These results support previous findings that UREs seem more successful at promoting the acquisition of basic scientific skills (e.g., observing and collecting data) rather than the higher order inquiry skills underlying critical scientific thinking (Kardash, 2000). However, it is important to recognize that this was the first URE in which our students had participated. It is likely that students who chose to participate in additional UREs offered during the academic year and subsequent summer would be given more opportunities to engage in higher order skills such as identifying specific questions for investigation, designing theoretical tests of hypotheses, and reformulating hypotheses based on one's results. Moreover, the fact that the students did not list these skills does not mean that they did not acquire them. It may be that these skills were simply not the ones that came to mind when students listed what they considered to be the most important things they learned from their UREs.

One of the most significant and striking aspects of the present study is the remarkable similarity between its findings and those reported by Seymour et al. (2004), despite marked differences in the conduct of the two studies. Seymour et al.'s sample comprised 76 students from four liberal arts schools; the sample in the present study comprised 72 students from one large, Midwestern, research- extensive institution. Seymour et al. used a checklist format with individual and focus group interviews to investigate whether students had indeed experienced a number of hypothesized benefits/gains from their UREs. By contrast, interns in the present study responded in writing to open-ended questions and a number of close-ended items. (Responses to other open-ended questions and close-ended items are reported in Kardash, Wallace, and Blockus, in press.) Seymour et al. reported their findings in terms of percentages of total observations; we reported our data in terms of percentages of students who wrote particular comments or phrases. Despite these differences, findings from both studies are very similar with respect to the gains and benefits students reported as a result of their participation in UREs.

It is important to note that our findings concerned student majors in the natural and physical sciences and mathematics. That raises the question of whether our findings would generalize to psychology students. As a reviewer of this article noted, the tools of the natural and physical sciences and of math are

more complicated than are those of psychology in many cases, but psychology involves more complex conceptual constructs. Despite this important distinction, we believe that the benefits and gains mentioned by our science and mathematic students would be similar to those acquired by psychology students involved in UREs. As an example, the scientific dispositions and habits of mind mentioned by our students are desirable ones for all researchers regardless of discipline and would be as likely modeled by faculty in the social sciences as those in the natural and physical sciences.

In sum, our findings lead us to conclude that the student-identified benefits resulting from participation in UREs are generally consistent with the benefits that UREs are presumed to provide. Those students who subsequently choose to enter research-oriented graduate programs will bring to those programs a realistic view of what is entailed in those programs, a set of dispositions appropriate to the conduct of research, and a set of basic research skills. Based on our findings, we believe further that UREs provide substantial benefits even for those students who choose not to pursue research science careers. We expect that those students will, at a minimum, enter their chosen careers with a renewed sense of self-direction, independence and confidence in their abilities to successfully tackle what lies before them. They will also undoubtedly display a deeper appreciation for research than would have been the case had they not participated in UREs.

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# Educational Goals Related to the Research Experience

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Since the formation of psychology in the late 1800s, students have gained knowledge of psychology by participating in research experiences. In fact, in the earliest days of psychology, students learned about psychology by replicating "classic" experiments and, subsequently, by conducting new experiments (Goodwin, 2003). Although the growth of applied psychology in the past few decades has likely led to an overall decline in the number of students who pursue research-oriented careers, research experiences have nevertheless continued to play a vital role in the education of undergraduate students, providing them with a hands-on way of learning more about psychology. In fact, several influential reports have suggested that participating in research can be one of the most important components of the psychology major's undergraduate experience. Below we briefly discuss two of these reports.

## The Quality Principles

St. Mary's College of Maryland played host in 1991 to the American Psychological Association's (APA) National Conference on Enhancing the Quality of Undergraduate Education in Psychology (also known as the St. Mary's conference). The goals of the conference were to "discuss critical questions for undergraduate educators" and "to synthesize the scholarship and practice of the teaching and learning of psychology" (McGovern, 1993, p. vii). From this gathering came the *Quality Principles*, "a concise blueprint for innovation and change in undergraduate education" (McGovern & Reich, 1996, p. 252). Recommendations contained in the *Quality Principles* identified knowledge of research methods, the ability to think scientifically, and research experience as important goals of undergraduate education.

## APA's Undergraduate Psychology Major Learning Goals and Outcomes

Approximately a decade after the St. Mary's conference, the APA's Task Force on Undergraduate Psychology Major Competencies identified 10 goals that psychology departments should strive to achieve (Halonen et al., 2002). The task force divided these goals into two general categories: "Knowledge, skills, and values consistent with the science and application of psychology" (e.g., understanding research methods, critical thinking) and "Knowledge, skills and values consistent with liberal arts education that are further developed in psychology" (p. 3) (e.g., communication skills, professional development). The task force subsequently outlined various subgoals, many of which entailed learning about psychology as a science.

## Undergraduate Research Experience: Primary Educational Goals

Clearly, teaching students "to think as scientists about behavior" (Brewer et al., 1993, p. 169) is an important goal of undergraduate education in psychology. Although undergraduate research experiences may not achieve all of the goals highlighted in the *Quality Principles* or in APA's learning goals and outcomes, we believe that such experiences can help achieve five primary goals: (a) knowledge of research methods, (b) the ability to think critically, (c) acquiring the values of a psychologist, (d) the ability to communicate effectively, and (e) personal and professional development. Below we discuss how research experiences help students achieve these goals and provide some evidence in support of these assertions.

### *Knowledge of Research Methods*

Regardless of whether students intend to pursue graduate education or seek employment, knowledge of research methods, and the technical and analytical skills that accompany this knowledge, will likely enhance their chances of achieving these goals (e.g., Briihl, 2001; Keith-Spiegel, Tabachnick, & Spiegel, 1994). Although students receive exposure to research methods in some of their courses, the opportunity to acquire hands-on experience will serve further to solidify their understanding of research methods.

Baker and Serdikoff (2006) found that students who participated in undergraduate research felt they knew more about research methods and had a greater appreciation of psychology as a science than students who did not have such experiences (see also Seymour, Hunter, Laursen, & Deantoni, 2004). Similarly, students in other disciplines who take part in research experiences believe their research skills improve as a function of their experiences; they also possess more knowledge of the research process, as measured by faculty reports (Kardash, 2000).

## *Critical Thinking*

Although learning course content is an important part of undergraduate education, teaching students to think critically about the information they encounter is arguably even more important. Whereas students will always have access to information about psychology (e.g., in books, on the Internet), they will need the skills to discern what information is accurate.

Again, undergraduates who participate in research tend to show gains in critical thinking, as well as improved "understanding [of] how to approach research problems" (Seymour et al., 2004, p. 498). These students also show better knowledge of how researchers answer scientific questions (Ryder, Leach, & Driver, 1999). Furthermore, the analytical skills that students often acquire while participating in research experiences may help them think critically about the information they encounter on television or on the Internet, for example, much of which is portrayed inaccurately (Saville, 2008).

## *Values of Psychology*

Obtaining a degree in psychology typically means that students come to know more than just course content—it means that they learn about, and hopefully acquire, a set values that characterizes most psychologists: the ability to "weigh evidence, tolerate ambiguity, act ethically, and reflect other values that are the underpinnings of psychology as a science" (Halonen et al., 2002, p. 14). Although students are frequently exposed to these ideas in their classes, the ideas often come to life when students have the opportunity to conduct psychological research. For example, although students may be familiar with APA's (2002) ethical guidelines before they participate in research experiences, assisting with data collection requires them to behave in accordance with these guidelines. Similarly, although students may know that tolerating ambiguity is important, this idea may become more salient when students analyze a set of data—especially if the data seem to contradict some previously held belief.

Students with undergraduate research experience are more likely to self-report the ability to "think like a scientist" and "appreciate scientific psychology" (Baker & Serdikoff, 2006). They also report more positive attitudes toward learning and research, and a deepened understanding of how the sciences are connected (Seymour et al., 2004).

## *Communication*

As many will attest, students are not fond of writing APA-style papers. "This isn't an English class, you know," some will object. Yet, as Sternberg (2004) pointed out, effectively communicating one's ideas is a vital part of the research process. Although researchers may have the best ideas in the world, only if they are able to communicate those ideas clearly will they have the opportunity to impact others (e.g., Bem, 2002; Silvia, 2007). Moreover, effective communication is likely to be an important skill regardless of which career paths students choose to follow. Thus, participating in research experiences—especially those that lead to conference presentations or publications—will give students the opportunity to learn how to communicate their ideas in a clear and concise manner.

Participating in undergraduate research often results in an improved ability to collaborate with others (Mabrouk & Peters, 2000) and improved writing and presentation skills (Bauer & Bennett, 2003; Kardash, 2000). In addition, Seymour et al. (2004) found that students from four different liberal arts colleges in a number of different disciplines (e.g., biology, mathematics, computer science, psychology) reported an improved ability to present and explain their work, make oral arguments, and comprehend scientific literature after conducting their own research.

## *Personal & Professional Development*

Finally, research experience gives students an opportunity to focus on personal and professional development. For instance, although many students become psychology majors with hopes of becoming clinicians, counselors, and the like (Saville, 2008), many are unaware of the specific duties that each of these entails. Research experience, whether basic or applied in nature, provides undergraduates an opportunity to learn more about some of the different areas of psychology and identify which area(s) appeals most to them. Identifying which areas of psychology interest them is especially likely when

students have the opportunity to work with several faculty members on different types of research projects or continue with one research group for an extended period of time (Seymour et al., 2004).

Not only do students who participate in research report improved confidence and self-esteem (Alexander et al., 1998; Seymour et al., 2004), but they are also more likely to present their research at conferences and co-author a publication, both of which increase their chances of gaining admission to graduate school (Carmody, 1998; Keith-Spiegel et al., 1994; Landrum, Davis, & Landrum, 2000). In fact, students who participate in research are more than twice as likely to be admitted into doctoral programs (Bauer & Bennett, 2003).

## Suggestions for Enhancing the Undergraduate Research Experience

In the preceding sections, we discussed five outcomes that likely result when students participate in undergraduate research. In the sections that follow, we provide additional tips for enhancing students' undergraduate research experiences.

### *Get Students Involved Early*

One way of increasing the likelihood that students will achieve the aforementioned goals is to get them involved early (e.g., Ishiyama, 2002). There are several ways to accomplish this. Ask your colleagues to announce research opportunities in their introductory courses. Talk to underclassmen in your department, tell them about your ongoing research projects, and explain to them why research experience is important. You might also have seniors who participated in research experiences talk to your students. Most importantly, give novice students the opportunity to join your research group. Although this means that you will have inexperienced students who might require more mentoring, you may also have the opportunity to grow professionally from these interactions.

### *Take Students to Conferences*

In our experience, it is very rewarding to watch students attend their first professional conference. Meeting the "big names" in our field can have a huge impact on students' professional development. Similarly, having students present their research can also be a great experience. However, as you well know, attending conferences can also be expensive. Thus, it is important to search for funding available for undergraduate projects. For example, the National Conference on Undergraduate Research (NCUR) provides funding to students who will be presenting their research at professional conferences; Psi Chi (http://psichi.org/awards), APA (http://www.apa.org/ppo/funding/atoz.html), and APS (http://psychologicalscience.org/apssc/undergrad/) also have such funds available. Your own institution may even set aside funds for students attending conferences. Encourage your students to apply for these funds.

### *Form a Research Group*

By participating in collaborative endeavors, students and faculty both reap a number of rewards (Davis, 1999). For students, these may include gaining research experience, presenting their work at conferences, and maybe even publishing a paper. Similarly, faculty receive a number of rewards as well. For example, in addition to the increased productivity that often results from having a number of students working together on several different projects, faculty get watch their students develop professionally, "perhaps the richest reward" (Davis, 1999, p. 202).

In our research groups, we include lower-level students who may be new to the group and who want to gain research experience and upper-level students who may be completing honors theses or helping with more advanced projects. Ideally, each research project includes students at all levels. In this way, the faculty member serves as more of a facilitator, and the experienced undergraduates direct the projects. Most often, students in our research groups conduct the studies on their own time; our large research meetings then become a forum for status reports, feedback, and brainstorming. Although such a set-up may take some time before it runs smoothly, it ultimately can be very productive and rewarding.

### *Ask Students to Help with Manuscripts*

Most psychology teachers consider writing to be a very important skill for students. However, many undergraduates do not get considerable practice, as it is often labor-intensive for teachers to give extensive feedback on a larger number of papers (Boice, 1990; Goddard, 2003). Thus, allowing students to be involved in your own writing projects can be beneficial to you and your students. Students can start by writing smaller sections of a manuscript or by reviewing a paper that you are writing; in time, they can make more substantial contributions.

### *Give Students Responsibility*

If you give students a chance to be responsible, they will rise to the challenge. Students can search for their own funding opportunities, plan their own conference trips, write their own IRB proposals, schedule rooms for running subjects, develop stimulus materials, and so on. As faculty, we need to supervise, not micromanage. As students gain more experience with research, they are able to assume more responsibility. For example, lower-level students may begin by entering data. As they become more comfortable and acquire more knowledge about research in general and about certain projects in particular, they may eventually be able to make decisions regarding different aspects of those projects (e.g., whether to continue collecting data or whether to manipulate a variable). This type of involvement gives students the opportunity to learn from their failures, both of which will be important after they graduate.

## Conclusion

Undergraduate research experiences can be some of the most academically challenging and rewarding experiences for students. Not only will your students gain valuable experience that will benefit them professionally, they will likely gain knowledge about themselves that will have a long-lasting impact on their personal lives.

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# Academic Outcomes Assessment in Undergraduate Education: Rationale & Process


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Higher Education is a pervasive and powerful agent in American life. Estimates of undergraduate enrollment in the year 2000 range from approximately 18 to 22 million students (Hurst and Hudson, 2005). For a considerable number of our citizens, higher education is the highway to a better and more fulfilling life. However, that highway is a toll road, not a freeway. In 2006, the average cost of tuition, room and board was about $13,000 per year at public four year institutions and over $30,000 at similar private institutions. It is unlikely that these costs will decline in the foreseeable future.

Given the economic opportunities that a college education can provide and in light of the considerable cost involved in obtaining that education, it is not surprising that institutions of higher education have begun to ask a critical but complicated question: How do you measure the intellectual benefits that an academic program provides its students? In light of the cost that individuals bear to earn that degree, it is reasonable to ask whether an academic program delivers on that promise. Posing the question is easy; finding an answer is more problematic.

Higher education today is remarkably diverse. Community colleges, four-year institutions, comprehensive universities, technical institutes, and performing arts conservatories all compete for students and all offer different flavors of educational experience. One assessment tool could not possibly cover all institutions, so the astute academic will look for an assessment process that maps onto the objectives of each program.

In many ways, program assessment resembles the process of designing and constructing a home. Before a single board is hammered into place, it is important to think carefully about what you want the house to accomplish. Is it a summer home or a year-round residence? Does your social life revolve around elaborate dinner parties, viewing sports events or movies at home in a casual environment, holiday visits from an extended family, or time spent in the garden? Based on these different needs, one individual would design a larger dining room, another a more expansive family room featuring a home theatre, a third would value additional bedrooms to house guests, whereas a fourth would prize glass doors that open out into a terraced garden. Once you have in mind the role which the house will play in your projected life style, you would then work to articulate a design that reflects what you expect to accomplish through building the house. The list of desired architectural features might be more extensive than time and money can provide and so you would temper your desires within realistic parameters. At the end of the process, you would decide which features worked and which did not. That evaluation would help you to decide if any modifications or additions should be planned for the future. This schema of priority setting, planning, execution, and evaluation is the heart of the academic assessment process. Let us now turn to that very topic.

The American Psychological Association (APA, 2007) proposes the following guidelines for departments engaged in the process of academic renewal. The major steps are:

- Laying the foundation for the assessment process
- Designing an assessment plan that fits the goals and objectives of the program
- Building a culture that values and sustains assessment while avoiding problems
- Applying assessment to the major.

## Laying the Foundation for the Assessment Process

The key issues at the outset are ownership, definition of goals prior to the assessment, and the identification of multiple measures that are consistent with your departmental and institutional goals.

Assessment of a departmental curriculum works best when faculty are not only willing to become involved but to become invested in the process. Faculty that view the assessment process as an unwelcome intrusion on academic freedom are less likely to design and conduct a meaningful assessment, whereas those departments that view the

process as an opportunity to improve, gain recognition, and secure additional institutional resources are more likely to feel that the process lead to significant improvements in their program. A second point in the preparation phase is the clear articulation of the objectives of the assessment. Is the purpose of the assessment to accelerate student learning or to evaluate the strengths and weaknesses of the program? Faculty often report that they ”know” what knowledge base and skill set the major is designed to convey to the students. In reality, extensive discussion about the objectives of the major and the relative importance of factors such as writing, content, statistical skills, hands-on clinical or lab skills will often lead to a thoughtful clarification of how the department should be articulating the mission of the institution through the curriculum. This discussion can then flow naturally into the consideration of assessment tools. A department at an institution that heavily values written expression as the tangible outcome of critical thought would likely chose a different set of assessment tools than an institute that is heavily focused on the development of skills that address technical, artistic, or clinical problems. It is unwise to put all your assessment eggs in one basket. The use of multiple measures that reflect departmental priorities is more likely to lead to a useful outcome than any single measure. Finally, be recursive. The fact that you have used a particular assessment measure in prior years does not mean that you are compelled to continue on with that same measure. Plan to revisit the selection of your assessment measures at the end of the procedure with the idea that you will use the outcome of the current process to guide future assessments.

## Designing Your Assessment Plan

With your assessment goals in place, the next step is to design the blueprint you will follow. Just as no one house plan fits every family, there is no one best way to assess student learning and the quality of a curriculum. Some examples are:

- Classroom and curricular measures such as in house exams as well as standardized tests such as the Major Field Test, classroom visits and course evaluations.
- Archival measures such as transcript analysis, syllabi analysis, data on earned degrees, graduate enrollment over prior years.
- Individual and group projects such as term papers, research projects, poster presentations, oral presentations can be evaluated for content and originality.
- Interviews and surveys such as exit and transfer interviews, alumni interviews, and surveys and feedback from graduate schools that have accepted your graduates.
- Self-assessment measures such as personal journals and reaction papers.
- Summative measures such as standardized tests, portfolios, capstone experiences.

Each of these measures has its pros and cons. As there is no single best assessment plan, the prudent department will consider how various assessment measures fit into their particular curricular and institutional mission.

## Implementing the Assessment Plan in a Sustainable Fashion while Avoiding Problems

Assessment works best when the process continuously informs the department’s on-going strategic planning process. Assessment should not be an episodic activity conducted to satisfy the periodic requirements of regional accreditation groups. When assessment procedures address questions that motivate the faculty and can be clearly seen to play a role in the distribution of resources by the administration, then the foundation for sustaining a meaningful culture of assessment is in place.

Even with a clear assessment blueprint in hand, a department can go astray in its assessment procedure in several ways. Common avoidable errors are

- Selecting inappropriate measures or too few measures.
- Mistaking the collection of data for the analysis and interpretation of data.
- Failing to translate conclusions derived from assessment into program change.
- Mistaking the process of assessment for progress itself.
- Proposing fatal solutions; i.e. solutions that are clearly unworkable given current budgets or reasonable staffing expectations.

Although pitfalls may lie in wait for the unwary, one can build best practices into the department assessment procedure just as easily. Here are but a few examples.

- The collection of assessment measures can be built into courses and annual reports.
- Specific courses can be designated as assessment points where data are regularly gathered for evaluation.
- Including alumni in the assessment procedure can build strong ties to the department and the institution; alumni are a

priceless source of outcomes and satisfaction data.

## Applying Assessment to the Major

After the planning process has lead to a detailed and appropriately tailored blueprint for assessment and the assessment has occurred, the process is near but not yet at completion. Translating the output of the assessment process back into the classroom completes the circle that began at the pre-planning stage. Departments may feel overwhelmed by the end of the process or may adopt a defensive posture. If the assessment process does not lead to meaningful curricular change, the entire effort was a waste. Here are a few techniques that may be useful to insure that the final report is not filed and forgotten.

- When assessment leads to suggestions for positive change as opposed to remedies for deficiencies, colleagues are more likely to relish the role of active participants in renewal.
- Assessment procedures may lead to the identification of a host of issues. In that case, it's critical to remember that Rome was not built in a day. You don't have to address all the issues at once. Instead, rank order the problems from most critical to least pressing and work on them ad seriatim.
- One way to involve dubious faculty is for institutions to codify in their Faculty Handbook that the scholarship of assessment is considered to be a component of academic renewal that is counted and valued during review for rank and tenure.
- Finally, it's important to keep in mind that many faculty really are overburdened. To the extent that assessment responsibilities can be assigned in accord with faculty expertise and interests and that the additional load incurred by assessment is minimized, enthusiasm and participation will be maximized.

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## Web Resources

The following web resources were used in the construction of this chapter.

- The American Psychological Association maintains a web site that provides a great deal of guidance for departments engaging in assessment. The assessment cyberguide for learning goals and outcomes can be found at http://www.apa. org/ed/guide_preface.html.
- The American Association for Higher Education provides a site entitled Nine principles of good practice for assessing student learning. It can be found at: http://cstl.syr.edu/cstl2/home/Teaching%20Support/Teaching%20Practice/14G000.htm
- What is good assessment? A synthesis of the principles of good practice in academic assessment provided by Linda Suskie. It can be found at: http://faculty.ccp.edu/dept/viewpoints/f03v4n1/suskie.html
- Perhaps the most comprehensive site on assessment is contained on the North Carolina State University Planning and Analysis site, which contains hundreds of links to resources for faculty and administrators engaged in assessment. It can be found at: http://www2.acs.ncsu.edu/upa/assmt/resource.htm

# Tools for the Assessment of Undergraduate Research Outcomes

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The recent focus on the importance of assessment has resulted in the development of a number of tools to assess student learning outcomes (e.g. Angelo & Cross, 1993). However, most of these tools have focused on what students learn in the classroom. The outcomes of student involvement in research tend to be less well defined, and therefore more difficult to measure, than the outcomes of traditional classroom learning. Nevertheless, some of the existing assessment tools may be appropriate for the assessment of learning through research, and others have recently been developed explicitly for that purpose (e.g. Lopatto, 2004; Tariq, Stefani, Butcher, & Heylings, 1998).

Of the many outcomes listed for psychology majors by the American Psychological Association (APA, 2002), those that seem to be particularly likely to be enhanced by conducting research include understanding research methods, critical thinking, and oral and written communication (assuming that the student writes a paper or gives an oral presentation of the research).

## Indirect Measures of Student Learning

Indirect measures are those that do not directly measure what a student has learned, but get at it indirectly, usually through self-report from the students. Indirect measures most commonly take the form of surveys or interviews. Over the last decade, a number of published studies have shown that students do report that they believe they learned a great deal from participating in research (Bauer & Bennett, 2003; Lopatto, 2004; Rueckert & Morgan, 2006; Russell, Hancock, & McCullough, 2007; Seymour, Hunter, Laursen, & DeAntoni, 2004). In particular, Lopatto (2004) has developed a set of learning outcomes, such as gaining an understanding of the research process, skill in interpretation of results, and so forth. He and his colleagues have found that students in a variety of disciplines rate themselves as having improved in these outcomes as a result of their research experience.

Russell et al. (2007) recently reported results from a number of surveys, including one that focused specifically on students in social, behavioral, and economic science. They found a number of positive outcomes in students who engaged in research (compared to students who did not engage in research), including an increase in confidence in research skills, and expectation they would one day obtain a Ph.D. Their survey is available at http://www.sri.com/policy/csted/reports/university/index.html#urosynthesis.

Kruger and Zechmeister (2001) have developed a skills-experience inventory aimed specifically at psychology majors, which is available at http://www-personal.umich.edu/~kruger/skills.html. Their inventory asks students to report whether they have engaged in activities related to a number of skills (e.g. "I have participated in writing of an article for a scientific journal.").

Indirect measures can be used to assess virtually anything, but faculty must keep in mind that they are only measuring what students *think* they have learned, which may or may not reflect true learning. They are most appropriate when the desired outcomes are something subjective, such as a change in student attitudes.

## Direct Measures of Student Learning

In contrast to indirect self-report measures of student learning, direct measures get at student learning directly by asking them to actually perform the targeted skill. There have been far fewer reports of the effects of research on student learning that have used these types of measures (but see Bauer, 2001 for a notable exception). This is likely because these measures are more difficult to create. There are a number of existing assessment tools, many of which have documented reliability and validity, that you could easily adapt to assess the outcomes of student research. Which tool you choose to use will depend on what your desired student outcomes are.

## *Written Research Report*

Most student research projects require some sort of written report that the student's advisor grades. These reports can be a valuable assessment source that requires little or no extra work on the part of the faculty advisor. Faculty can use written reports to assess students' ability to write, to analyze and synthesize, to think critically, and to understand research methodology. Of course it is important to assure that faculty evaluate these reports in a well-defined, objective manner. The best way to achieve an objective evaluation is through the use of a rubric. Rubrics are assessment tools that can be used to measure virtually anything, but they are usually used to measure outcomes that can not be easily captured by simpler standardized tests (Moskal, 2000). Rubrics usually take the form of a grid that includes a list of outcomes or criteria, and standards that describe successful performance at multiple levels. They can be holistic, which means they give one description of successful performance overall, or they can be analytic, which means they break performance down in to a number of factors, each with its own set of criteria. Analytic rubrics are more common and are probably better suited to assess research reports. Rubrics are usually shared with students in advance, so they will know what professors expect of them.

Several web sites, some of which are listed at the end of this chapter, include more details on how to develop good rubrics, as well as examples of existing rubrics. It is usually easiest for faculty to use existing rubrics, or to modify them slightly, so they do not have to reinvent the wheel. Many are for written papers in general, but there are a few that psychologists have developed that specifically focus on psychological research. At Northeastern Illinois University psychology faculty have developed a rubric for scoring our students' required capstone papers (most of which are research reports). You can find it at http://www.neiu.edu/~lruecker/capstone.doc. Gotfried and Vosmik are currently in the process of developing a more detailed APA-style paper rubric. They will eventually make it available on the Office of Teaching Resources in Psychology web site (http://teachpsych.org/otrp/). Tariq, Stefani, Butcher, and Heylings (1998) have created a detailed rubric for the assessment of projects, including research projects. Their rubric is somewhat unusual in that it assesses the entire research process. It includes things like "plan of action" and "initiative", in addition to criteria for scoring the final written report.

## *Critical Thinking*

Although there is no one definition of critical thinking everyone agrees upon, most psychologists and educators assume that it includes the ability to analyze, synthesize, and evaluate claims. More specifically, in relation to psychological research, critical thinking could involve the ability to formulate hypotheses, conceive of alternatives, and develop plans for experiments (Ennis, 1993). Several standardized tests of general critical thinking ability have been used in a number of contexts (for a review, see U.S. Dept. of Education, 2000). Among the most commonly cited are the Watson-Glaser Critical Thinking Appraisal (Watson & Glaser, 1994) and the California Critical Thinking Skills Test (CCTST; Facione, Facione, Blohm, Howard, & Giancarlo, 1998; http://www.insightassessment.com/test-cctst.html).

The Watson-Glaser is a multiple-choice test that tests critical thinking in five categories: inference, recognition of assumptions, deduction, interpretation, and evaluation of arguments. It has two forms (A and B) that faculty can use as pretest and posttest. The current price for the Watson-Glaser is $284 for a packet of 25 tests. (For examples of questions, see http://www.harcourtassessment.com).

The CCTST is also a multiple-choice test. Its subtests are inductive reasoning, deductive reasoning, analysis, inference, and evaluation. The current price for the CCTST is $180 for a packet of 25 tests.

In addition, Lawson (1999) has developed a test specifically for critical thinking about psychology. It involves open-ended questions about the validity of various claims. Although they answer key gives specific correct answers, scoring is somewhat subjective.

## *Statistical Reasoning*

The most comprehensive resource for tests of statistical reasoning is the NSF-funded Assessment Resource Tools for Improving Statistical Thinking (ARTIST) project (delMas, Ooms, Garfield, & Chance, 2006). This web site (https://app.gen.umn.edu/artist) includes over 1000 test items on a variety of statistical topics that users can search and download for their own use. The test items consist of both multiple choice and open-ended questions. It also includes 11 unit tests on specific topics and the Comprehensive Assessment of Outcomes in Statistics that instructors and students can access after requesting an access code. The web site also includes links to other statistical reasoning assessment tools.

### *Other Assessment Tools*

Halonen, Bosack, Clay, & McCarthy (2003) have developed a rubric that gives specific criteria for five levels, ranging from "beginner" to "professional graduate and beyond," for a number of skills related to scientific inquiry in psychology. The comprehensive nature of this rubric makes it best suited for portfolio-type assessment of an entire curriculum. The Association of College and Research Libraries (2003) has created a detailed information literacy rubric. There are a number of oral presentation rubrics, and a few scientific poster rubrics, available online. Some are listed in Table 1.

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**Table 1**

***Internet Resources for Rubrics***

| | Description | URL |
|---|---|---|
| Rubrics in general | Michigan State University Online Instructional Resources. Links to many sites with instructions for creating rubrics, tutorials, and examples of rubrics. | http://www1.provost.msu.edu/facdev/instructionalresources/Assessment/rubrics.asp |
| | MidLink Magazine Teacher Tools at North Carolina State University. A number of examples of rubrics and templates. Mainly focuses on K-12 but could be modified for college students. | http://www.ncsu.edu/midlink/ho.html |
| | Texas Center for Educational Technology. Links to general information, technology-related rubrics, rubric software. | http://www.tcet.unt.edu/START/instruct/general/rubrics.htm |
| Oral presentation rubrics | Center for Transportation Research and Education at Iowa State University. Ten criteria with four levels of achievement. Could be used for any type of presentation. | http://www.ctre.iastate.edu/educweb/oralpres.pdf |
| | MidLink Magazine Teacher Tools at North Carolina State University. Six criteria with four levels of achievement. Focuses on student presentations in any field. | http://www.ncsu.edu/midlink/rub.pres.html |
| | Northwest Regional Education Laboratory. Assesses verbal and nonverbal effectiveness, appropriateness, and responsiveness. | http://www.nwrel.org/assessment/pdfRubrics/oralassess.PDF |
| | Texas Center for Educational Technology. Assesses nonverbal skills, vocal skills, and content. | http://www.tcet.unt.edu/START/instruct/general/oral.htm |
| Poster rubrics | Genesis mission at NASA. Can be used for any scientific poster. | http://genesismission.jpl.nasa.gov/educate/scimodule/data/interaction_synthesis/SAPoster_Rubric.pdf |
| | C. L. Hansvick's checklist for psychology posters at Pacific Lutheran University. | http://www.plu.edu/~hansvicl/teaching_posterchk.pdf |

# The Value from the Perspective of the Workplace/Community

**Christopher Koch**

***George Fox University***

A commercial aired during basketball season in which a student athlete is shown in the gym doing basketball drills while the voice-over claims "I'll probably end up in Chicago or New Orleans." After a pause, the student comments, "that is where most jazz musicians go". There are several NCAA commercials like this that show collegiate athletes from different sports who vaguely talk about their career goals. Each commercial ends with the tag line "most athletes are turning pro in something else." The same can be said for psychology majors. Most psychology majors do not pursue careers as psychologists. Instead, most psychology majors go "pro in something else". Fortunately, psychology is an excellent major for developing the skills that employers desire. Students who engage in undergraduate research are particularly well qualified for the job market (cf., Sleigh & Ritzer, 2007). Therefore, in this chapter, I will examine the skills employers are looking for in employees along with the skills developed through research in order to highlight the match between research and employment opportunities. I also present some strategies for marketing these skills.

## Employment Skills

A number of psychologists have examined the types of skills employers are interested in (e.g., Appleby, 2000; Gibson, Kahn, & Mathie, 1996; Landrum, 2001; Landrum & Harrold, 2003; Sleigh & Ritzer, 2004). There is considerable consistency in their findings. Employers generally want their new employees to have good interpersonal and communication skills, to be able to solve problems, to have a desire to learn new skills, and to be able to adapt to changing situations. Similarly, the Occupational Information Network (http://online.onetcenter.org) has identified six groups of skills for identifying potential career opportunities by matching personal skills with the skills required for a particular job. These skill groups include basic skills, complex problem solving skills, resource management skills, social skills, systems skills, and technical skills. Basic skills center on facilitating learning and acquiring new knowledge. Within this skill set is the ability to understand the implications of new information, to ask appropriate questions, to evaluate the strengths and weaknesses of arguments, looking for alternative explanations, and using math and science to solve problems. Additionally, employers want to hire employees who can comprehend written material, write effectively, and be able to clearly articulate information orally.

Complex problem solving skills relate to the ability to solve novel and ill-defined problems in real-world settings. To accomplish this, employees must be able to identify complex problems and review related information in order to develop and evaluate potential solutions. Resource management skills pertain to the efficient use of resources. Resources can be financial, material, personnel, and time. Social skills concern the ability to work with other people. Included in this skill set is the ability to adjust one's own actions in relation to the actions of others, to teach others how to do something, helping others reconcile differences, persuading others to change their minds, looking for ways to help others, and understanding the reactions of others to your own actions. System skills relate to understanding, monitoring, and improving social systems. Therefore, considering the cost/benefit of certain actions, determining how to improve a procedure, process, or interaction, and assessing and improving performance are valuable skills. Finally, technical skills are associated with machines and technical equipment. These skills include installing equipment, performing maintenance and repairing equipment, and monitoring equipment for proper functioning. Selecting the proper equipment for a job, analyzing product requirements, programming and software proficiency, and troubleshooting are important skills in this set as well.

## Research Skills

How is research related to employment skills? First, it is important to examine the requirements of a

student who conducts a research project. In general, research requires that you develop a knowledge base on a topic or topics, identify important questions, assimilate information relevant to those questions, design a strategy or method for assessing and answering the questions, understand the implications of the answers, and describe the entire process in verbal and written form. Undergraduate research opportunities, therefore, should require students to read scientific literature; design some aspect of the research project; work on a team independently of, but mentored by, a faculty member; have a sense of ownership in the project; master a laboratory technique or method; and have the opportunity to present the research orally and in writing (Lopatto, 2003). As a result, research provides an active learning experience in which students can identify and develop a variety of skills. For instance, LaRoche (2004) noted that conducting literature reviews, determining the proper methodology, controlling variables, using statistics, and preparing presentations are among the things learned best through undergraduate research opportunities rather than through class work alone. Further, she noted that research can lead to higher levels of insight, analytic abilities, and collaborative experiences (including mentoring).

With regard to specific skills, many aspects of conducting a research project map nicely onto specific employment skills (see Table 1). Research can improve these skills. For instance, Bauer and Bennett (2003) found that students involved in undergraduate research show significantly higher skills associated with speaking effectively, independently acquiring information, acting as a leader, understanding scientific findings, using statistics and math, critically analyzing literature, having clear career goals, and displaying intellectual curiosity as compared to students not involved in research.

Students appear to be aware of these skills and their development as well. For example, Lopatto (2003) found that students most frequently claimed that the most beneficial outcomes of research included learning the research process, learning to work independently, learning laboratory techniques, and understanding scientific reasoning. As students progress through the research process they become more productive in regard to scholarship and more confident in their abilities, feeling more prepared for jobs and graduate programs than their counterparts who were not mentored through the research process (Koch, 2002). In addition, as students continue in research over one, two, and three semesters, the benefit they derive from research increases (Bauer & Bennett, 2003).

**Table 1**

***A non-comprehensive list of skills valued by employers and the related research skills or experiences***

| Employment Skills | Research Skills/Experience |
|---|---|
| Use the scientific method to solve a problem | Developing a hypothesis, designing a study, collecting and analyzing data, and interpreting the results |
| Gather and organize information from multiple sources | Conducting a literature review; writing the introduction and discussion |
| Remaining open-minded about alternative explanations | Considering competing theories and alternative accounts of the data |
| Determine the proper equipment needed for the task | Designing a study |
| Hold high ethical standards | Proper treatment of participants including informed consent, debriefing, and confidentiality |
| Statistical analysis using software (e.g., Excel, SPSS)* | Analyzing data |
| Perform descriptive and inferential statistics | Analyzing data |
| Write clearly and precisely while addressing the needs of the audience | Writing a journal-style paper |
| Prepare presentation with software (e.g., PowerPoint, Publisher, etc.) | Preparing a poster presentation or a talk |

## Selling Skills

If research serves as a tool for developing the skills that employers are interested in, it is important for students to understand exactly what they are learning to do through research so that they can convey those skills to potential employers. Therefore, it is important for faculty members to help students see and document all of the skills learned during the course of a research project being sure to include specific examples whenever possible. An example form for accomplishing this type of documentation appears in Table 2. A list of skills learned is important for preparing a resume. When a student lists working on a research project as a related-work experience, he or she can provide a short summary of responsibilities and can indicate the skills learned or utilized while working on the project. Documenting skills on a resume can also help get an interview. Furthermore, having specific examples of successfully applying those skills can enhance an interview. During interviews, the examples become important because students can describe specific instances in which they used particular skills and what they learned from those

instances. In addition, they can present these examples with confidence knowing that they were successful in the past applying their research-related skills; therefore, they will likely be successful on the job applying those same skills. Displaying an appropriate level of confidence in one's ability may help secure the position.

Although faculty can help students prepare resumes, faculty are generally more familiar with vitas and with evaluating people within the academic community but not as familiar with evaluating people in the business world. Therefore, students should also be encouraged to use Career Services to properly hone a resume that conveys their research-related skills in the most effective manner. Mock interviews are also available through Career Services. Mock interviews provide an excellent opportunity for students to practice incorporating relevant examples of their research skills and experiences into responses to typical interview questions.

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## Table 2

### *A sample form for documenting the skills learned or enhanced during a research project*

| General Project Information |
|---|
| Project Title:<br><br>Co-Authors:<br>Faculty Mentor: |
| Hypothesis:<br><br>Independent Variable(s):<br><br>Dependent Variable(s):<br><br>Design:<br><br>Findings and Implications: |

| Skills |
|---|
| o Plan and carry out a project successfully<br>o Use the scientific method to solve a problem<br>o Show initiative and persistence<br>o Gather and organize information from multiple sources<br>o Understand written material in work related documents<br>o Think logically and creatively<br>o Identify complex problem(s)<br>o Remained open-minded about alternative explanations<br>o Determine the proper equipment needed for the task<br>o Install equipment<br>o Monitor and maintain equipment<br>o Computer programming*<br>o Hold high ethical standards<br>o Statistical analysis using software (e.g., Excel, SPSS)*<br>o Perform descriptive and inferential statistics<br>o Document preparation using Word*<br>o Write clearly and precisely while addressing the needs of the audience<br>o Prepare presentation with software (e.g., PowerPoint, Publisher, etc.)*<br>o Speak articulately and persuasively<br>o Exhibit effective time management |
| Specific Examples |
| Briefly describe any unique or particularly meaningful learning experiences during this research project related to the skills checked above. |
| Also, if you worked in a group, describe what you learned about the group process and your tendencies doing group work. |

*Aspects of computer literacy and technical skills

# An Undergraduate's Perspective on the Undergraduate Research Experience: From a Trained Monkey to a Scientist

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The undergraduate stage in education is bursting with opportunities to guide students toward becoming scientists who can complete research projects. Take advantage of the opportunities given: begin as a trained monkey (complete the tasks of a research project that are so easy a trained monkey could do them,) learn the ropes, and deal with the frustrations of each new task in order to become a scientist.

My experience with undergraduate research began in my first semester of college. I did not even begin at trained monkey status. I was merely a student – the only freshmen student in a statistics course of upperclassmen. Because I had no other exposure to psychology courses, I did not know (as I assume the upperclassman knew) that part of the reason for obtaining a psychology degree was to learn how to become a scientist. Ignorant of the value of learning statistics for psychological research, I subsequently viewed the course as another math class in which I merely had to memorize formulas in order to compute correct answers on tests. Aside from a few terms like Chi Square (which I remember because I was scolded for pronouncing Chi as the coffee shop drink chai), I did not retain much knowledge from the course. I fully regret studying for a grade rather than studying to remember the valuable skill of computing statistics.

However, I did benefit from the course. I benefited from the required participation hours in other's research projects. Though I did not view the experience as beneficial at the time, I eventually learned from the frustrations I felt while participating. Most memorably frustrating of the required research participation was the project that consisted of a two-hour survey that addressed a few topics, chiefly religion, that I committed myself to filling out. By commitment, I mean that I wrote my name down on a sheet which then obligated my participation. If I did not participate, my grade in statistics would suffer by a few points. Although the notion of being docked points was frustrating, I realized later that it was not nearly as frustrating as being the researcher whose participants did not show. Thus, the valuable lesson learned was that taking steps to ensure smooth participation may be frustrating to the participants, but is necessary for an efficient study.

Another frustration I felt with the required participation, which I later accepted as necessary due to guidelines set by the Institutional Review Board to ensure a study meets ethical standards, was the necessity of handing over photo identification in addition to a slip of paper signed by my parents permitting their 18 year old child, yet still a student at a university, to participate in research. However, the most frustrating part of the whole experience was the dullness of the experiment. I thought that I would be contributing to a research project, the type of research projects that people who watch too much CSI and people who think of NASA when they hear the word research conjure up. Instead, I found myself filling out question after question, most of which seemed too similar to each other to even be necessary to complete, for hours. However, again, I learned later that the two hour long survey compiled of repetitive questions was indeed a necessary tool for research. It was necessary for finding significance, or not, within a study. It was necessary for scientifically adding to a body of knowledge. In short, my first experience with undergraduate research afforded me the opportunity to later understand that protocol may not be fun but is always necessary, and that research does not have to be mind blowing to be important.

My next experience with research was still not even at the trained monkey level. Again, I was the only freshmen student in a research methods course. Again, I was merely attempting to memorize material in order to get a good grade. Fortunately, however, the course involved enough "hands-on" opportunities that I remember the basics of research which I was taught. The most important tool I learned about was the APA manual. The most important task I completed was becoming certified to do research. And the most important concept I retained was that of

confounding. Because I learned how easily a research project could be confounded, I also learned how to problem solve and eliminate those problems, and how to be critical of all research.

I used my freshly honed critical skills in every aspect of my life, except for completing research. It had not yet dawned on me that I should have been extending my undergraduate research experience outside of the classroom. Not until my advisor mentioned that I needed research experience in order to be accepted into graduate school did I decide to take the next step, which was to find and help with an area of research that I thought would aid my acceptance into medical school, but one that was still in the psychological field. Consequently, I sought out a professor and asked to help with a research project. When the professor informed me that I would be useful to help finish her study, I was ecstatic. Obviously, I took the opportunity to do research and remained ecstatic until I realized what she meant by the word help.

I helped by spending an entire summer sitting in a cold lab room staring at a tiny TV screen, watching tape upon tape of black-and-white film from a security camera. The tapes contained trial upon trial of dark mice running around a white, round table, either passing or sticking their heads into one of several dark holes around the parameter of the table. My task was to record the time of each trial, the number of times the mouse stuck approximately the majority of its snout into a hole, and also several other discriminating factors, which meant I had to watch the same trial several times before I could move on to the next trial. I contributed a great amount of time to this project. I sacrificed time from my summer doing work I thoroughly hated and was thus frustrated when someone explained to me that I had actually contributed very little to the project. I was merely a trained monkey. I helped with a substantial research project, but I did not do anything of substance. A trained monkey could have done my job.

I was so frustrated with the whole experience that I decided not to continue with that field of research. Instead, I found another research project to help with. Again, I was only a trained monkey because I was merely collecting demographics, but I thoroughly enjoyed the work. I read files of offenders at a forensic unit which included specific information on the most recent crime they had committed (if any), family history, school history, juvenile history, and much more. My task was to condense the files of information onto a demographic form and then enter the information into a database. Although the general task does not sound interesting, reading the files was fascinating. This brings me to the key to beginning research. It is essential to first find an interesting project and then to determine if helping with low-level data entry or demographics is worth the effort. *Worth* is the operative word. Although I did not consider my first research assistant project (watching films of mice running around a table) to be worthy of my time, it may have been worth the painstaking summer hours to someone who wanted to gain more responsibility in a similar project.

The second research assistant position was worth my time. Not only was the research interesting, but my professor gave me the use of the dataset I helped to create in order to complete my own research project. And I took the opportunity, but only after the suggestion from my advisor to do so. Once more, I was still not aware of the benefits of completing undergraduate research, and would not have attempted to gain a grant to do research had my advisor not mentioned the value. Thus, I stumbled into completing a proposal for my project much as I stumbled into finding a research assistant project. I was not active in deciding the project's topic. I merely took on a project which my professor suggested. Consequently, it took a great amount of time to simply understand the material essential to the project, let alone form a hypothesis and create a proposal. Creating proposals was so new to me, and I was so busy with school work that writing the proposal was frustrating, perhaps the most frustrating part of completing the project. Condensing grand ideas for research projects into a short, yet comprehensive, breath-taking, yet understandable, proposal is not simple. However, I used the Internet, found many sources regarding proposal writing, and with the help of my advisor, I wrote a proposal that landed me one of two grants that I applied for, affording me the opportunity to understand the phrase "writing for an audience." Funds for a project will only come if the person funding the project deems it valuable. My university did not deem sex offender research valuable. However, Psi Chi did understand the value of my proposal and thus awarded me a grant.

Though I claimed that the proposal was the most frustrating part of my research project, I did not claim that it was the most difficult. As I mentioned earlier, I stumbled into the project. I knew nothing about the concepts of my project: cognitive deconstruction and anything related to sex offenders. Thus, I spent another summer contributing a great amount of time to only a small part of a research project, reading journal article after journal article just attempting to understand the basics. Eventually, I delved into the topic so greatly that even my advisor admits that I know more about some specific aspects of sex offenders than he does. However, I had no product at

the end of the summer. I had a couple drafts of introductions and methods, but no statistics or discussion. My motivation to complete the project waned. It took several months to finally attach a second author to the project in hopes of reaching completion. However, with the second author's excitement to be a part of the project and with my new motivation fired by my accountability to him, we worked fast and completed a poster which my partner presented at a conference.

The conference itself was another great undergraduate research opportunity. Only undergraduate students could display and discuss their projects with others at the conference, most importantly with the judges who were professionals in the field of psychology. Having the judges dissect the projects and give feedback allowed the students to understand which areas they needed to strengthen both within their project and within their presentation skills. Because my second author presented the poster at the conference, I have still not experienced a large scale conference. However, I took the opportunity to present at my university's student research conference in order to enhance my undergraduate research experience. Presenting to supportive professors eased my apprehension about presentations. Discussing my project with naïve individuals who equated forensic psychology with the television show CSI allowed me to develop a precise, understandable discourse about my project. As a result, I will be more comfortable and perhaps more effective at professional conferences in the future.

Subsequent self assurance is a cardinal result of the undergraduate research experience. These experiences afford students the opportunity to learn how to complete research so that they can feel less reservation about working on substantial research in the future. Undergraduates are in college to hone skills, to become critical thinkers who can identify a problem, and to create solutions through scientific research. The sooner undergraduates realize that college provides opportunities which are incredibly valuable for personal growth and success in the research area, the sooner the undergraduate can begin to become a trained monkey, learn the ropes, and deal with the frustrations of a new task in order to become a scientist. However, undergraduates need guidance and assistance with the novelties of research. Therefore, if you are an undergraduate, seek out a mentor to help you realize that having a substantial undergraduate research experience is beneficial.

# The Value from the Graduate School Perspective


## Christopher Koch

*George Fox University*


Why is research important for admission into graduate school programs? Involvement in research is important for at least four reasons. First, research can help a student determine his or her area of interest in psychology, thereby allowing for a more focused search of graduate programs. Second, working with a faculty member on research can help yield better letters of recommendation. Third, undergraduate research provides an excellent opportunity to enhance several secondary criteria for graduate school admission. Finally, engaging in research helps develop research-based skills that are important for success in graduate school.

## Determining an Area of Interest

An understanding of the literature is essential when conducting research. As students gain an appreciation for the types of studies already conducted and begin to formulate ideas for their own study, they also learn whether or not that particular area of research is interesting to them. If it is not interesting, they know to pursue a different area of psychology. If it is interesting, an excellent strategy for students to employ is to contact the researcher or researchers whose journal articles they have read that are particularly appealing to them. Before emailing the researcher(s), however, the student should explore the researcher's website, conduct a PsychINFO search on the researcher's name, and read three to five of the most recent publications of the researcher. Having a good understanding of the researcher's goal and recent findings will help the student write an email message that not only introduces himself or herself to the researcher but also shows the researcher how well their research interests match the student's and provides a glimpse of what the relationship might be like throughout the graduate program. Such an approach has several benefits. First, many applications contain an item asking whether or not the applicant contacted anyone at the school. By contacting a researcher in the department, the student can answer affirmatively to this item. Second, articulating whom a student wants to work with in graduate school and why the student has this desire will enhance the statement of purpose of the student. Third, giving evidence of a purposeful evaluation of the graduate faculty demonstrates the drive, initiative, and determination that are valuable in completing a graduate program. Finally, a positive exchange between a student and potential faculty advisor before submitting an application can create an important advocate for the student after the application is submitted.

## Improved Letters of Recommendation

The three main criteria used to assess an applicant's admittance into a graduate program are college GPA, letters of recommendation, and personal statements (Landrum, 2005; Norcross, Kohout, & Wicherski, 2005). Graduate programs are highly competitive; therefore, letters of recommendation must be exemplary. The more a faculty member knows a student, the better the letter of recommendation can be (Terre, 2002; see Landrum, 2006). Although faculty can get to know a student through courses, the knowledge is limited. Working together on a research project, however, provides a context for a faculty member to assess the skills of a student to get to know a student on a more personal level. Faculty should take advantage of these opportunities to learn about a student's goals, drives, and ambitions within appropriate professional boundaries. Further, research provides a context for faculty to better assess how motivated a student is, his or her work ethic, scholarly ability, research skills, writing skills, speaking skills, creativity, and knowledge of the area of study. These factors are among the most valued applicant characteristics by graduate programs (Appleby, Keena, & Mauer, 1999). Combining information about classroom ability, research ability, and personal qualities can produce outstanding letters of recommendation. In addition, faculty are able to enhance their letters of recommendation by including specific examples from the research project. Performance-related examples are important inclusions for increasing the positive perceptions of an applicant (Knouse, 1983). Likewise, students can use information gained through their research experience to write compelling personal statements with clear goals and objectives.

For example, students can write about what they learned in psychology, their understanding of the research process and different methodologies, why they are interested in a particular area of psychology, the kind of research they would like to pursue in graduate school and beyond, etc. Again, the ability to use specific examples drawn from their research experiences will greatly enhance their personal statements (related resources are available online through the Psychology Graduate Applicant's Portal (www.psychgrad.org; see Burgess, Conley, Decker, & Devitto, 2001).

## Enhanced Secondary Criteria

Faculty on admissions committees want to know if applicants can successfully complete the graduate program. Essentially, Ph.D. graduate programs have two components: courses and dissertation research. College GPA and GRE scores provide some evidence of an applicant's ability to complete the coursework part of the program. Letters of recommendation often address both the academic and research aspects of the program. However, when a large number of applicants have high college GPAs and GRE scores as well as outstanding letters of recommendation, the admissions committees must consider secondary criteria (Keith-Spiegel & Wiederman, 2000). For instance, the committees want to assess how well an applicant can work independently and on part of a research team, carry out a research project, analyze data, and communicate the findings. These are some of the abilities that are necessary to complete the research aspect of the program. What better way to determine an applicant's future success at research than to examine his or her past research experience? Therefore, research that has been completed and presented at a conference, or possibly published, becomes an important factor in the admissions process. With this in mind, faculty should help students develop a research plan that includes multiple projects and results in scholarly products (e.g., conference presentation) before the student begins preparing a graduate school application (Koch, 2005).

## Summary

Figure 1 depicts some of the relationships that exist between undergraduate research and graduate school. First, faculty think research experiences provide important preparation for graduate school (Landrum & Nelson, 2002). Graduate schools also value undergraduate research and use it as a criterion for acceptance into graduate programs (Vittengl et al., 2004). Further, students who engage in undergraduate research feel better prepared for graduate school (Huss et al., 2002). Although undergraduate students interested in attending a doctoral program are more interested in undergraduate research than students who are not interested in graduate school (Vittengl et al., 2004), they still underestimate the impact research can have a graduate school admission (Briihl, 2001). Therefore, it is important for faculty to stress the value of undergraduate research for graduate school preparation and admission and to provide research opportunities that students can complete before the graduate school application process begins.

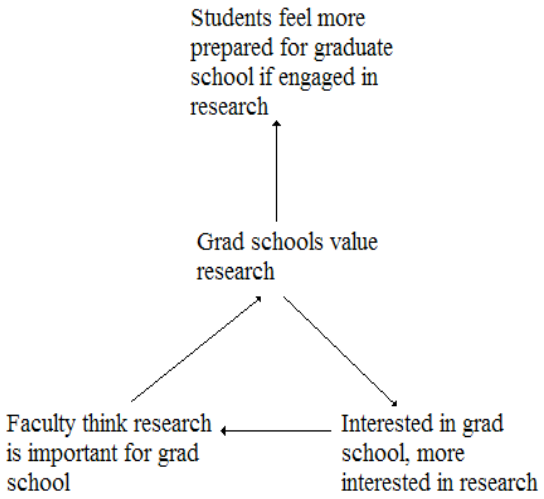


***Figure 1.*** **Relationships between undergraduate research and graduate school acceptance and performance**

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[1]Related resources are available online through the Psychology Graduate Applicant's Portal (www.psychgrad.org; see Burgess, Conley, Decker, & Devitto, 2001).

# Our Contributors

## Ellen Altermatt
*Hanover College*

Ellen Altermatt received her Ph.D. in developmental psychology from the University of Illinois at Urbana-Champaign. Now an assistant professor at Hanover College, Dr. Altermatt teaches courses in Child and Adolescent Development, Adulthood and Aging, Psychology of the Family, and Psychology of Gender. Dr. Altermatt's research focuses on understanding the development of achievement-related beliefs. Her most recent work employs daily diary and observational methods to examine the role that peers play in socializing children's responses to academic success and failure. Undergraduate students have been instrumental in this work and have co-authored both presentations and papers with Dr. Altermatt.

## T. William Altermatt
*Hanover College*

Bill Altermatt has a Ph.D. in social psychology from the University of Illinois at Urbana-Champaign. He has been an assistant professor at Hanover College since 2003 and teaches social psychology, research methods, and introductory psychology. Dr. Altermatt's research interests are in gender stereotypes, especially as they relate to chivalrous norms and policies favoring the protection of women.

## Joanne D. Altman
*Washburn University*

Joanne D. Altman is a Professor of Psychology at Washburn University of Topeka. She received her M.A. and Ph.D. in Experimental and Comparative Psychology from Temple University, and earned a Post Doctoral Certificate at Johns Hopkins University, School of Medicine.

Dr. Altman's research interests include psychological well-being in captive wildlife, animal-human interaction, and animal cognition. Since 1988 she has published 14 articles and presented 20 professional papers; many of these publications and presentations were with undergraduates. Dr. Altman works extensively with student researchers. Since 1993, she has supervised 86 students engaged in 103 undergraduate and graduate student research projects. She also leads student study abroad trips to South America and Africa.

Dr. Altman is currently serving in her third term as an elected councilor in the Psychology Division for the Council of Undergraduate Research. Dr. Altman won Washburn University's three Faculty Awards. In 2003, she won the Ned N. Flemming Excellence in Teaching Award. In 2004, she won the Herrick Award for Outstanding Service, and in 2007 the A. Roy Meyer's Award for Excellence in Research.

## Eric Amsel
*Weber State University*

Eric Amsel is Professor and Chair of the Psychology Department at Weber State University. He teaches Introductory Psychology, Child Psychology, Adolescent Psychology, Research Methods, and various senior seminars. He received his Ph.D. in Human Development from Columbia University and previously taught at the University of Saskatchewan and Vassar College before joining the Weber State University faculty. Dr. Amsel's research interests include the acquisition of scientific, mathematical, and hypothetical reasoning skills from childhood to adulthood and the techniques to effective teach such skills. Dr. Amsel's research interests include the acquisition of scientific, mathematical, and hypothetical reasoning skills from childhood to adulthood and the techniques to effective teach such skills.

Dr. Amsel has published over 30 articles, reviews and chapters including *The development of scientific thinking skills* (with D. Kuhn and M. O'Loughlin), *Change and development: Issues of theory, method and application* (with K. Ann Renninger), and *Language, literacy, and cognitive development: The development and consequences of symbolic communication* (with J. Byrnes).

Dr. Amsel serves as the Vice President of the Jean Piaget Society and Associate Editor of *New Ideas in Psychology*. He was awarded the Endowed Professor in the Social and Behavior Sciences (2002-2005), John S. Hinckley Fellow (2006), and Presidential Distinguished Professor (2007) at Weber State University. In 2006, he was named the Carnegie/CASE, Utah Professor of the Year.

## Ruth L. Ault

*Davidson College*

Ruth L. Ault is the Nancy and Erwin Maddrey Professor of Psychology and Chair of the Department of Psychology at Davidson College. Dr. Ault earned her B.A. from Pomona College and M.A. and Ph.D. from the University of California, Los Angeles. She is a fellow of the American Psychological Association and won the Thomas Jefferson Teaching Award from Davidson College.

Dr. Ault's research interests focus on cognitive development in preschoolers and college students. She has studied memory and problem solving techniques used by both age groups and has written a book on the topic: *Children's Cognitive Development* (Oxford University Press). As an outgrowth of her seminar on gender identity, she has become interested in exemplifying concepts in human development using baby diaries, science fiction, modern and classical novels, and short stories.

Dr. Ault served as an associate editor for *Teaching of Psychology*; she is currently an Executive Editor for the *Journal of Genetic Psychology.* For APA Division 2 (the Society for the Teaching of Psychology), she is a past treasurer and current Director of the Office of Teaching Resources in Psychology. For the Society for Research in Human Development, she has been treasurer, secretary-historian, and chair of the program committee.

## Lisa Baird

*University of San Diego*

Lisa Baird is Professor of Biology at the University of San Diego. She completed the Ph.D. in botany at the University of California-Davis, and taught briefly at Connecticut College before joining the faculty of the University of San Diego, where she served as chair of the Department of Biology from 1992-2007. A firm believer that students learn science by doing it, Dr. Baird has promoted an investigative curriculum in biology and is an advocate for enhanced opportunities for student-faculty research collaboration. She was a founding coordinator of SURE, and continues as co-coordinator of the program. She has been active in the Council on Undergraduate Research (CUR), and co-authored and helped to implement Research-Link 2000, a CUR-NSF project for development of web-based collaborative exercises in biology. Dr. Baird has also authored several grants in support of curriculum development.

## Emily Balcetis

*Ohio University*

Emily Balcetis is an Assistant Professor of Psychology at Ohio University after receiving her Ph.D. in Social and Personality Psychology from Cornell University. She teaches 400 person sections of Introduction to Psychology and (much) smaller graduate seminars in social cognition, motivation, and social perception. In addition to being a McNair Program Advisor, she works with several Ph.D. students and supervises undergraduate students on theses, independent projects, and research.

Dr. Balcetis' research falls at the intersection of social and cognitive psychology. Specifically, she investigates what and how motivations constrain visual perception, social judgment, and decision making. This work would not be possible without the involvement of undergraduates at all levels of development. Dr. Balcetis was the recipient of the 2004 Clark Distinguished Teaching Award offered by the College of Arts and Sciences at Cornell University. In 2007, she received the Society for Experimental and Social Psychology Dissertation Award for her work regarding the influence of motivational states on visual perception.

## Steve Barney

*Southern Utah University*

Steve Barney is an associate professor of psychology at Southern Utah University, a primarily undergraduate institution in the Western United

States. In addition to his teaching load, he serves on the Undergraduate Research Board, the University Service Learning Committee, and he supervises between four and twelve undergraduate research projects per semester. He received his B.I.S. from Weber State College in Ogden, Utah. Both his M.S. and his Ph.D. are in Clinical Psychology and were awarded at the University of Wyoming in Laramie, Wyoming.

Dr. Barney is interested in clinical and educational testing, psychometrics, and active pedagogical practices. He has authored or coauthored 28 scholarly works that have been either published or presented at peer-reviewed forums. He has also supervised 35 student projects that have also been published or presented at professional conferences. In addition to his faculty position, he serves as a staff psychologist for the local public mental health agency. He has twice been honored as a Distinguished Faculty at SUU and was recently elected Professor of the Year by a student, staff, and faculty review panel. When he is not working, Dr. Barney enjoys hiking, camping, fishing, racquetball, and being with his wife and 5 adorable children.

## Barney Beins
*Ithaca College*

Barney Beins is Professor of Psychology and Chair of the Department at Ithaca College. He is a Fellow of APA, and was president of the Society for the Teaching of Psychology in 2004; he served as its secretary from 1992 to 1994. He has taught at Ithaca College since 1986. He was Director of Precollege and Undergraduate Education at APA from 2000 to 2002. He has been on APA's Board of Educational Affairs and on the Board of Directors for the Eastern Psychological Association. Barney is author of *Research Methods: A Tool for Life* and co-author (with Agatha Beins) of *Effective Writing in Psychology: Papers, Posters, and Presentations*. He co-edited the *Gale Encyclopedia of Psychology* and contributed to the *International Encyclopedia of the Social Sciences*, published by Thomson-Gale, and the *Readers Guide to the Social Sciences*, published by Fitzoy Dearborn, a London publisher.

He founded the Northeastern Conference for Teachers of Psychology in 1994. He also participated in the St. Mary's Conference in 1991, in the Psychology Partnerships Project in 1999, and in the second National Conference on Undergraduate Education. He served as inaugural editor for the "Computers in Psychology" section of *Teaching of Psychology* from 1987 to 1996, and as an Associate Editor. He is a member of the American Psychological Society, Sigma Xi, Psi Chi, the American Statistical Association, the Eastern Psychological Association, and the New England Psychological Association. He earned his bachelor's degree from Miami University in Oxford, Ohio, and his doctorate from City University of New York.

## Paul A. Bell
*Colorado State University*

Paul Bell is in his 28th year at CSU, where besides his teaching duties, he serves as university mediation officer, coordinator of the Applied Social Psychology Graduate Program and director of the Center on Aging. The center opened its doors three years ago. "Our goal is to integrate teaching, research and outreach related to aging," he says. "We have 25 faculty involved, taking on several research projects and developing workshops, such as on geriatric mental health." The center recently received a million-dollar grant that will allow it to expand services to Alzheimer's families and patients in rural areas. Studying Alzheimer's has been an interest of Paul's since 1979, when his mother was diagnosed with the disease. He since has found that 25 other members of his family have suffered from Alzheimer's.

Paul is a Fellow of the American Psychological Association and Charter Fellow of the American Psychological Society. In November, Paul won the Pennock Distinguished Service Award for meritorious and outstanding achievement at Colorado State University.

## Joseph J. Benz
*University of Nebraska at Kearney*

Joe Benz is Professor of Psychology at the University of Nebraska at Kearney. Dr. Benz received his Ph.D. in Experimental Psychology with an emphasis in Animal Behavior in 1990 from the University of Nebraska. He has been at UNK ever since. Dr. Benz's research interests include Sandhill crane mate choice behavior as they stage for

eight weeks in the Platte river valley every spring on their migratory journey every spring. He is also interested in human jealousy, particularly differing reactions of men and women to various inducements of jealousy.

Dr. Benz is active in various professional organizations, including the Rocky Mountain Psychological Association, Sigma Xi, Nebraska Psychological Society, and the Animal Behavior Society. Dr. Benz has received several awards for teaching at UNK, including the Pratt-Heins Foundation Award for Outstanding Teaching, Honors Teacher of the Year, and the UNK Creative Teaching Award.

## Linda Blockus
*University of Missouri-Columbia*

Linda Blockus earned her Ph.D. in Higher Education from the University of Missouri Columbia and is the Director of the campus-wide Office of Undergraduate Research at MU. Her responsibilities include working with MU students during the academic year and summer and directing science research programs in the summer funded by NSF, NIH, USDA, and a variety of campus sources for approximately 100 MU and visiting undergraduates. She was elected as a Councilor in 2002 to the Council on Undergraduate Research (At-Large Division) and was a founding Councilor of the Undergraduate Research Program Directors Division in 2005 and continues to serve in that Division.

## Charles L. Brewer
*Furman University*

Charles Brewer received his B.A. degree in psychology from Hendrix College and his M.A. and Ph.D. degrees in General Experimental Psychology from the University of Arkansas. He also did graduate work at Indiana University and postdoctoral work at Harvard University and the University of Michigan. After teaching at The College of Wooster in Ohio and Elmira College in upstate New York, he joined the faculty at Furman University in 1967, was promoted to the rank of Professor in 1970, and was named the William R. Kenan, Jr., Professor of Psychology in 1998 He teaches General Psychology, Experimental and Statistical Methods, Learning, and History and Systems. After editing the journal titled *Teaching of Psychology* for 12 years, he was named Editor Emeritus in 1996. He has co-edited several handbooks for teachers of introductory psychology, statistics, and research methods. His numerous articles and book chapters cover a wide range of topics, including undergraduate education in psychology and the life and work of John B. Watson, the founder of behaviorism who graduated from Furman in 1899. Charles has received numerous accolades, including the American Psychological Foundation's Distinguished Teaching Award in 1989. This prestigious award now bears his name.

## Jill Brown
*Creighton University*

Jill Brown is an Assistant Professor of Psychology at Creighton University. She received her Ph.D. in developmental psychology from the University of Nebraska. While her roots are in the Midwest, her work has taken her to other parts of the world. She was a Peace Corps volunteer in Namibia, Southern Africa and received a Fulbright Fellowship to study in Benarus, India. Her teaching and research focuses on the psychological underpinnings of culture and human development. She has conducted research on gender norm development and masculinity in Namibia, specifically looking at how hegemonic ideas of masculinity fuel the HIV/AIDS crisis. Her current research focuses on the developmental outcomes of child fosterage in Africa, again drawing implications for HIV/AIDS orphans. Dr. Brown's teaching specializes in Qualitative and Mixed methods in psychological research.

## Jennifer A. Bruns
*Minnesota State University-Mankato*

Jennifer Bruns is a graduate student in the Technical Communication program at Minnesota State University-Mankato. She earned her bachelors degrees in Psychology and English from the University of Nebraska-Kearney. Jennifer is employed as the Education Director for New Horizons Crisis Center. At New Horizons Crisis Center, she specializes in organizing and providing numerous educational offerings appropriate for schools, universities, law

enforcement, medical personnel, human services, among other community groups and agencies.

Jennifer currently works with crime victims by providing services such as crisis counseling, information and referrals, and advocacy in legal and medical settings. Jennifer has further devoted time to a special projects grant from the Minnesota Department of Health, in efforts to improve the provision of healthcare to survivors of sexual violence. Through her grant work, Jennifer has been a keynote speaker at a regional conference for dental professionals.

In her graduate studies, Jennifer's research interests include the impact of computer-mediated communication on identity. She is also interested in the use of sexist language in technical communication, and technical communication as related to victim rights.

## Susan Burns
*Morningside College*

Susan Burns is an Associate Professor in the Department of Psychology at Morningside College (Sioux City, IA). Although her teaching load is somewhat diverse in the area of psychology, her teaching emphasis is on the human development courses (i.e., Child and Adolescent Psychology, and Developmental Psychology). Beyond her course load, Susan actively encourages students to become engaged in the research process. She currently has several students involved in both group and individual research projects investigating a variety of topics (e.g., bullying in high school, empathy and gender roles in adolescents enrolled in an intake treatment facility, cross-sectional analysis of short term memory functioning, academic dishonesty, and gender role beliefs in relationships). Her students actively present at local, small regional and large regional, and national conferences.

Her personal research interests include psychological and physiological responses to violent and non-violent videogames, correlates and predictors of homophobia, attachment security between preschoolers and their mothers, and academic dishonesty. Dr. Burns was selected as a recipient of the 2004 Sharon Walker Faculty Excellence Award, the 2006 state of Iowa, American Association of University Women Distinguished Faculty Award recipient, and the Omicron Delta Kappa Honor Society 2006 Faculty Person of the Year. Susan received her B.S. and M.S. in Experimental Psychology from Emporia State University (Emporia, KS) and her Ph.D. in Personality/Social Psychology with an emphasis in Child Development from Kansas State University (Manhattan, KS). Her previous appointments include a part-time visiting professorship at Washburn University (Topeka, KS) and a graduate teaching assistantship at Kansas State University (Manhattan, KS).

## Christie Cathey
*Missouri Southern State University*

Christie Cathey is an Associate Professor of Psychology at Missouri Southern State University. Dr. Cathey began teaching at Missouri Southern in 2002 after completing her Ph.D. in Social Psychology from the University of Connecticut. Dr. Cathey is very involved with Missouri Southern's international mission and has taken groups of psychology students to France and China to conduct cross-cultural research. She has also taught several senior level courses that focus on the intersection of culture and psychology.

Dr. Cathey is a strong supporter of undergraduate research and has served as an associate editor for the Journal of Psychological Inquiry since 2004. She has also supervised numerous senior thesis research projects, several of which have been presented at undergraduate research conferences. In addition to her pedagogical research, which focuses on the use of online message boards to enhance seated courses, Dr. Cathey conducts research that examines culture, power, and perspective taking.

## Isabelle D. Cherney
*Creighton University*

Isabelle D. Cherney is Associate Professor of Psychology at Creighton University where she supervises 16 undergraduate research assistants. She received her Ph.D. in Educational Psychology and Cultural Studies from the University of Nebraska – Lincoln in 2001. She has presented her research at over 80 national and international conferences with 85 undergraduate students, and has sponsored over

50 student presentations and publications. The majority of her publications and grants have undergraduate coauthors.

Dr. Cherney's research interests focus on the development of cognitive sex differences and how they affect career science choices, the development of gender-schemata and their effects on incidental memory as well as cross-cultural differences in children's and adults' perceptions of children's rights. She has published articles on the use of technology in the classroom, mathematics and statistics anxiety, the use of physics scores as predictors of the medical college admissions tests, and the effects of active learning on students' memory for course content.

Dr. Cherney was selected as the 2007 Carnegie Foundation for the Advancement of Teaching Nebraska Professor of the Year. She has served as director and assistant director of the Creighton University honors program and received the Creighton University Major Advisor award in 2005.

## Gil Einstein

*Furman University*

Gil Einstein received his Ph.D. degree from the University of Colorado and teaches at Furman University, where he chaired the department from 1994-2006. He won Furman University's Meritorious Teaching Award in 1985 and was the first recipient of Furman University's Excellence in Teaching Award in 2006. He has served on the editorial boards of the *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *Memory & Cognition*, and *Psychology and Aging*, and he is a Fellow of Divisions 2, 3, and 20 of the American Psychological Association. His research focuses on the processes involved in prospective remembering, how these processes break down in important real-world situations, and how they are affected by aging. He has published over 75 articles, chapters, and books, and his research has been supported by the National Institute on Aging, the National Institute of Mental Health, and NASA. He and Mark McDaniel are co-authors of a 2004 book titled *Memory Fitness: A Guide for Successful Aging* and a 2007 book titled *Prospective Memory: An Overview and Synthesis of an Emerging Field*.

## John Falconer

*University of Nebraska at Kearney*

John Falconer is Director of the Office of Sponsored Programs at the University of Nebraska at Kearney. In addition to supporting the development of extramural funding for the University, he runs a Summer Student Research Program, publishes the *Undergraduate Research Journal*, and supports other student research activities.

Falconer holds a M.A. in Foreign Affairs from the University of Virginia, and the Ph.D. in Higher Education Administration from the University of Nebraska-Lincoln. His research publications include works on access to higher education, minorities in the criminal justice system, student experiences in undergraduate research programs, and the economic impact of universities. Dr. Falconer founded the Midwestern Conference on Research at Predominantly Undergraduate Institutions, is an elected member of the Council of Undergraduate Research, and serves on the program committee for the Conference on Applied Learning in Higher Education.

## Krista D. Forrest

*University of Nebraska at Kearney*

Krista Forrest is an associate professor of psychology at the University of Nebraska at Kearney. Since 1999, Dr. Forrest, her colleagues, and students have been investigating the efficacy of police interrogation methods. Currently she is examining (a) mock jurors' perceptions of police interrogations, (b) the effects of false polygraph results on confession rates, and (c) the influence of polygraph monitoring on minors convicted of alcohol offenses. She has published related articles in *Current Research in Social Psychology*, the *Journal of Witness Credibility and Assessment*, and *Personality and Individual Differences*.

In addition to her work on interrogations, Dr. Forrest has published 12 articles on teaching issues in such journals as *Teaching of Psychology, The Psychology Teachers Newsletter* and the *College Student Journal*. In 2002 she received an outstanding teaching presentation award from the Society of for the

Teaching of Psychology and in 2003 and 2005 she received the UNK Creative Teaching Award. In 2007 she received the Early Career Award from the Rocky Mountain Psychology Association.

## Roger Fouts
*Central Washington University*

Roger Fouts is Director of University Research and co-director with Deborah Fouts of the Chimpanzee and Human Communication Institute (CHCI) at Central Washington University (CWU). CHCI is dedicated to the education of students and public alike. In addition, Roger is a Professor of Psychology and CWU Distinguished Research Professor.

Roger has been a part of Project Washoe since 1967. Project Washoe is the first and longest running project of its kind. Washoe was the very first nonhuman being to acquire a human language, American Sign Language for the Deaf (ASL). The project now focuses on the signing of its four sign language using chimpanzees who live together as a social group: Washoe, Tatu, Dar and Loulis.

Roger has more than 100 articles published in scientific journals and books. In 1997, Roger Fouts wrote Next of Kin, a memoir of his life with Washoe and which was selected by The Los Angeles Times as one of top 100 books of 1997.

Roger is active in improving living conditions and treatment of captive chimpanzees and in the protection free-living chimpanzees in Africa. Roger received his Ph.D. in Experimental Psychology from the University of Nevada – Reno in 1971 and did his undergraduate studies at the CSCLB.

## Daniel J. Foy
*University of Nebraska - Lincoln*

Daniel Foy is currently pursuing his M.A. in Cultural Anthropology at the University of Nebraska – Lincoln. He earned his B.A. in Anthropology from the University of Missouri – Columbia in 2006. His research interests include evolutionary psychology, cross-cultural religious behavior, the evolution of cultural ideas, and human phenotypic plasticity.

## Rick Froman
*John Brown University*

Rick Froman is Professor of Psychology and Chair of the Division of Humanities and Social Sciences at John Brown University. Dr. Froman specializes in the areas of experimental psychology, the psychology of humor, and the use of technology in teaching. His current research interests include encouraging spiritual formation and learning communities in online courses. He is currently developing a campus-wide assessment to use in evaluating student critical thinking outcomes in the Core Curriculum. He is also working to increase the use of technology in the classroom, which is a continuation of his work as a former Teagle Fellow in Technology in Teaching.

Dr. Froman enjoys mentoring students on research projects that are presented at undergraduate conferences. Each year, Dr. Froman accompanies JBU psychology students to the Arkansas Symposium for Psychology Students where they give oral presentations of their research projects. He also edits and publishes the annual John Brown University Psychology Department online undergraduate research journal. He is in the process of expanding this project next spring to include submissions from students representing a variety of disciplines at JBU.

## Cal Garbin
*University of Nebraska at Lincoln*

Cal Garbin joined the UNL faculty in 1985, after receiving his degree in experimental psychology from the University of Texas at Arlington. His initial investigations of multimodal perception and cross-modal memory for object attributes such as shape and texture eventually gave way to an overwhelming desire to understand how web-based technology can be used to increase the speed, depth, and application of student learning. His courses include a cradle-to-grave (well, sophomore-to-doctorate, at least) series of research methods and data analysis classes and an on-line Introductory Psychology course. Much of his research is collaborative, which, along with his consulting work,

allows him to apply and continually broaden his methodological and statistical skills and have some great stories for class. He has received several teaching awards, including the Hazel R. McClymont Distinguished Teaching Fellowship (2007), admission to the UNL Academy of Distinguished Teachers (2003), Award for Distinguished Teaching From College of Arts & Sciences (1994 & 2003), Association of Students at UNL Outstanding Educator of the Year Award (nominated 1997 & 2007 and awarded 2003) and the Certificate or Recognition for Contributions to Students from the UNL Parents Association and UNL Teaching council (12 times in 15 years).

## Cynthia Gibson
*Washington College*

Cindy Gibson recently joined the Psychology Department at Washington College after six years as an Assistant Professor of Psychology at Creighton University. She is currently supervising six undergraduate thesis projects, teaching primarily laboratory-based undergraduate courses in the Behavioral Neuroscience major tract, and is actively engaged in traumatic brain injury research that spans basic protein analysis and behavioral outcomes involving memory acquisition. She worked for several years as an associate in the neuroscience division of large NIH-funded grants focused on improving science education infrastructure in Nebraska and providing neuroscience scholarships and research training to undergraduates.

Dr. Gibson received her Ph.D. in Experimental Biological Psychology from Virginia Commonwealth University in 2001. Since that time she has mentored more than 60 undergraduate research students and sponsored more than a dozen undergraduate publications and professional conference presentations.

## Cathy A. Grover
*Emporia State University*

Cathy Grover is Associate Professor and Director of the MS Experimental Psychology program at Emporia State University. Dr. Grover teaches undergraduate Descriptive Research Methods and Statistics in Psychology, Experimental Research Methods and Inferential Statistics in Psychology, Physiological Psychology, Drugs Brain and Behavior, Foundations of Psychology, Sensation and Perception, and Theories of Motivation. She received her Ph.D. in Experimental Psychology from Texas A&M University and completed an NIEHS postdoctoral fellowship in the department of Medical Pharmacology and Toxicology at the Texas A&M Health Science Center.

Dr. Grover's uses rodent models to study the effects of drugs (e.g., caffeine, ethanol) or environmental pollutants (e.g., lead) on social behavior, learning, attention, memory, etc. Other research interests include issues related to college teaching and college students (e.g., cheating, effective study behaviors, and behaviors of superstar students). There are typically 5-10 undergraduates and as many as 4 graduate students working in her rat lab each semester. Her rat labbies are frequently coauthors on conference presentations and publications.

Dr. Grover is a member of the association for Psychological and Educational Research in Kansas (PERK), the Southwestern Psychological Association (SWPA), Teaching of Psychology, and the Society for Neuroscience (SFN). She has been sponsor of the ESU Psychology club since fall of 2001 and enjoys accompanying numerous undergraduate and graduate students at the annual meetings of PERK, SWPA, and the Great Plains Student Psychology Conference (GPSPC).

## Jane Halonen
*University of West Florida*

Jane Halonen serves as the Dean of the College of Arts and Sciences at the University of West Florida. Previously, Dr. Halonen held the position of Director of the School of Psychology at James Madison University. In this role her responsibilities included oversight of the largest undergraduate program on campus, seven graduate programs, and an on-campus out-patient training clinic. Prior to her time at James Madison, Dr. Halonen served seven years as the Dean of the Behavioral Science Division at Alverno College.

Dr. Halonen is a past president of the Council of Teachers of Undergraduate Psychology (CTUP) and is a fellow of APA's Division 2. She has been active

on the Committee of Undergraduate Education, helped design the 1991 APA National Conference on Enhancing the Quality of Undergraduate Education, and served on the committee to develop standards for teaching high school psychology and on the APA Partnerships Project planning committee. In 2000, Dr. Halonen won the Distinguished Teaching Award from the American Psychological Foundation for excellence in teaching as well as contributions to the psychology teaching community. Dr. Halonen has published four textbooks, co-authored two electronic books, and co-authored or edited numerous other books and CD-ROMs.

## Joseph Hamm

*University of Northern Colorado*

Joseph Hamm is a senior double major in psychology and criminal justice at the University of Northern Colorado. He is currently working in Dr. Brian Bornstein's Law-Psychology lab at the University of Nebraska-Lincoln as part of the UNL Research Experiences for Undergraduates program.

Joseph has worked on several research projects with faculty, including several experimental studies involving jurors' juvenile defendants. He is currently working with Dr. Bornstein on ear witness testimony research. Additionally, he has completed a content analysis of original documents from hate and violent groups.

Joseph has served as the Vice President of Academic Affairs for the University of Northern Colorado Interfraternity Council and Vice President-Internal of Lambda Chi Alpha. He is also a member of Psi Chi and a McNair scholar under the mentorship of Dr. William Douglas Woody. He will apply to graduate programs in psychology and law for the 2008-2009 academic year.

## David Hansen

*University of Nebraska-Lincoln*

David Hansen is Professor and Chair of Psychology at the University of Nebraska-Lincoln (UNL). Through the UNL Psychological Consultation Center (the department's clinic for training, research, and service) he co-directs the Family Interaction Skills Clinic and directs Project SAFE, a clinical research and treatment program for sexually abused children and their families.

Dr. Hansen's primary research area is child maltreatment (sexual abuse, physical abuse, neglect, and witnessing domestic violence), including assessment and intervention with victims and families, and the correlates and consequences of maltreatment. An additional area of research is social-skills assessment and intervention with children and adolescents. Dr. Hansen is the Senior Editor of *Education and Treatment of Children*, the Associate Editor for Research-Practice Link for *the Behavior Therapist*, and also serves on the Editorial Boards of *Aggression and Violent Behavior, Clinical Case Studies*, *Cognitive and Behavioral Practice,* and the *Journal of Family Violence*.

## Matthew T. Huss

*Creighton University*

Matthew T. Huss, PhD, MLS, is currently an Associate Professor at Creighton University in Omaha, Nebraska. He also is a graduate of the University of Nebraska Law and Psychology and Clinical Psychology training programs. He is the author of over 40 different scholarly publications and a forthcoming textbook on forensic clinical psychology, *Forensic Psychology: Research, Practice, and Applications*. His primary research interests focus on the prediction of violence (Huss & Zeiss, 2004), domestic violence (Covell, Huss, & Langhinrichsen-Rohling, 2007), psychopathy (Huss & Langhinrichsen-Rohling, 2006), and sex offenders (Baumgartner, Scalora, & Huss, 2002). In addition, he has significant interests in training and education in law and psychology (Huss, 2007; Huss & Skovran, 2008) and has served as a Consulting Editor for *Teaching of Psychology*.

## Michael Ichiyama

*University of San Diego*

Michael Ichiyama is Associate Professor of Psychology at the University of San Diego. He received his doctorate in clinical psychology from the University of

Cincinnati in 1989, and completed postdoctoral work as a research scientist in the Department of Psychiatry, Alcohol Research Center, at the University of Michigan. He has supervised many students in internship placements and in research, and his students have received awards for outstanding research presentations at such meetings as the Western Psychological Association. Dr. Ichiyama is a licensed psychologist in the State of California, with scholarly interests in the study of college alcohol abuse, multicultural psychology, and social influences on the self-concept. He currently serves as co-coordinator of the SURE program.

## Mary Lee Jensvold
*Central Washington University*

Mary Lee Jensvold is the Assistant Director at the Chimpanzee & Human Communication Institute. She is an adjunct instructor in the Anthropology Department and Primate Behavior & Ecology Program and an Adjunct Research Associate in the Psychology Department. She supervises numerous graduate and undergraduate students in these programs. Her research topics with the chimpanzees include conversational repair in chimpanzee-human conversations, imaginary play, private signing, topic maintenance, representational drawing, phrase development, chimpanzee to chimpanzee conversations. Other research interests include humane care techniques, environmental enrichment, laughter and humor in chimpanzees, space use, and public education about chimpanzees. She is active in improving conditions and care for captive chimpanzees.

## Jennifer M. Johnson
*Creighton University*

Jennifer Johnson is a recent graduate from Creighton University. During her undergraduate career, she assisted a professor for three introductory psychology courses, assisted her professors' research projects in the fields of cognitive and forensic psychology, and completed her own research in the field of evolutionary and forensic psychology. She attended undergraduate research conferences and is currently applying to attend a professional research conference for an ongoing research project in the area of forensic psychology.

Miss Johnson is a member of Alpha Sigma Nu (The National Honor Society of Jesuit Colleges and Universities), The National Honor Society of Collegiate Scholars, Omnicron Delta Kappa (the National Leadership Honor Society) and Psi chi (the National Honor Society in Psychology). The latter organization awarded Miss Johnson a Summer Research Grant which was used to complete a project in the area of forensic psychology.

## Edward P. Kardas
*Southern Arkansas University*

Ed Kardas is full professor of psychology and is in his 28th year at Southern Arkansas University. He did his graduate work at LSU and his undergraduate work at Johns Hopkins University and the University of Baltimore. He was an undergraduate for six years (three bad years and three good years) and received a grade of C in general psychology in the Spring of 1968. Kardas also taught at LSU-Eunice and the University of Wisconsin-Milwaukee. His professional interests revolve around teaching with technology, writing textbooks, and service to the Southwestern Psychological Association. Ed is married (19 years!) to the former Julie McCuller of Texarkana and they have three children ranging in age from 10-16 years. Golf consumes many of his leisure hours.

## CarolAnne M. Kardash
*University of Nevada – Las Vegas*

CarolAnne Kardash is Professor of Educational Psychology at the University of Nevada -Las Vegas. Dr. Kardash received her PhD in Educational Psychology from Arizona State University and completed a NIMH post-doctoral fellowship in cognitive psychology in the Psychology Department at the University of Massachusetts-Amherst. Prior to coming to UNLV, she served as a faculty member at the University of Missouri-Columbia for 15 years. She also taught summer classes at the University of Notre Dame as part of its Alliance for Catholic Education Master's Program.

Dr. Kardash's research has focused on two areas. First, she has examined how people's topic-specific

beliefs, epistemological beliefs, and attitudes influence their processing of text, with a particular emphasis on people's memory for controversial information. Second, as an evaluator for several NSF-funded grants dealing with science education reform efforts at the undergraduate level, she has investigated the role of undergraduate research internships on interns' research skills and career plans. Her work in these two areas has appeared in the *Journal of Educational Psychology and Contemporary Educational Psychology.*

Dr. Kardash served as Associate Editor of the *Journal of Educational Psychology* from 2003 until 2005. She presently serves on the editorial boards of *Contemporary Educational Psychology, Educational Psychology Review, and the Elementary School Journal.*

## Theresa Kay
*Weber State University*

Teri Kay is an Associate Professor of psychology at Weber State University. Her current teaching load includes Introductory Psychology, Inter-personal Relationships, The Science and Profession of Psychology, Abnormal Psych-ology and Child Development.

In addition to her teaching duties, Dr. Kay is chair of the department's Practicum Committee. As such, she is in charge of organizing the application process and placement of students in various practicum sites. Dr. Kay personally supervises 3 practicum students and several individual student research projects each semester.

Dr. Kay is also has a small clinical practice. She works at a local mental health agency, and her duties include psychological testing and consultation.

## Kenneth D. Keith
*University of San Diego*

Ken Keith is Professor of Psychology at the University of San Diego. He received the Ph.D. from the University of Nebraska-Lincoln in 1975. He subsequently served on the faculties of the University of Nebraska Medical Center, Nebraska Wesleyan University, and the University of San Diego. From 1992-1999 he served as department chair at Nebraska Wesleyan, and was chair at the University of San Diego from 1999-2007. Dr. Keith is a Fellow of the American Psychological Association and the Western Psychological Association, and has published widely on topics related to the teaching of psychology, cross-cultural psychology, quality of life, and intellectual disabilities. He has conducted national institutes and numerous short workshops on the teaching of high school psychology, and is Chief Reader Designate for the Advanced Placement Psychology examination program. He was one of the founding coordinators of the SURE program, and his students regularly present and publish their work in professional venues.

## Maya M. Khanna
*Creighton University*

Maya Khanna is an Assistant Professor of Psychology at Creighton University. Dr. Khanna's research program examines the relationship between executive functions (e.g., attention, working memory, and inhibition) and the cognitive processes of reading and memory in children and adults. One of her research goals is to design educational applications that coincide with the development of these psychological processes.

Dr. Khanna received her undergraduate training in psychology at Washington University in St. Louis. After graduating, she served as a high school science teacher with Teach For America. Interactions with high school students lead to her present interest in reading and memory development. She found that many of her teenage students had trouble using context clues while reading new words imbedded in scientific texts. This piqued her interest in the development of these reading processes in younger children. Thus, Dr. Khanna sought graduate training in cognition and development at The University of Michigan. After receiving her Ph.D. in 2006, Dr. Khanna joined the faculty of Creighton University where she teaches classes in developmental psychology, psychological research methods, and statistics. Dr. Khanna greatly enjoys working with students at Creighton and has supervised over 20 student-generated research projects in her short time there.

## Joyce Kinkead
*Utah State University*

Joyce Kinkead is Professor of English and Associate Vice President of Research at Utah State University. She is the editor of the Jossey-Bass volume *Valuing and Supporting Undergraduate Research* (2003) and author of a chapter in the CUR publication *Developing and Sustaining a Research-Supportive Curriculum* (2007) on "How Writing Programs Support Undergraduate Research." Her scholarly work includes *The Center Will Hold: Critical Perspectives on Writing Center Scholarship*, which won two national best book awards. She is also a CUR councilor.

## Kevin Klatt
*University of Wisconsin-Eau Claire*

Kevin Klatt has a master's degree in behavior analysis from Southern Illinois University and a Ph.D. in developmental and child psychology from the University of Kansas. Dr. Klatt is a board certified behavior analyst whose interests are primarily in using applied behavior analysis in community settings for persons diagnosed with developmental disabilities, including autism. His research includes investigating verbal behavior, preference assessments, and identifying procedures that are most effective in teaching skills to young children with autism. Dr. Klatt is an associate professor and the founder and director of the Campus Autism Program at the University of Wisconsin-Eau Claire.

## Christopher Koch
*George Fox University*

Christopher Koch is Director of Assessment and Professor of Psychology at George Fox University. Dr. Koch received his PhD in Cognitive-Experimental Psychology from the University of Georgia. He has been at George Fox University since 1993 where he has served in a number of positions including department chair and Director of Scholarship.

Dr. Koch's research interests include attention, perception, and working memory. In particular, he is interested in Stroop-like processing using a variety of stimuli within the visual and auditory modalities. Dr. Koch's recent research examines the role of attention in the perception of facially expressed emotions. The vast majority of his research has been conducted with undergraduate and graduate coauthors who have received a number of research grants and awards. Dr. Koch's teaching emphasis is in statistics, research methods, and cognition.

Dr. Koch has been a Fulbright scholar to Russia and is a fellow of the Western Psychological Association. He has served as a Councilor for the Psychology Division of the Council for Undergraduate Research (CUR) as well as western region Vice-President and National President of Psi Chi, the National Honor Society in Psychology. Dr. Koch is currently the editor of the *Psi Chi Journal*.

## John H. Krantz
*Hanover College*

John Krantz received his undergraduate degree from St. Andrews Presbyterian College in Laurinburg, NC. He received his doctorate from the University of Florida. From the University of Florida, he worked for Honeywell primarily on the development of new technologies for cockpit displays. In particular, his research related to the use of flat-panel displays to replace the CRT in commercial airplanes. He joined the faculty at Hanover College in 1990. Since joining the department he has served several times as department chair and as the division head for the natural sciences. He has diverse research interests with papers and presentations on a wide variety of topics including modeling the early stages of the visual system and the use of the internet for psychological research. He has held several offices for psychological organizations including President for the Society for Computers in Psychology (SCiP). He is currently the editor for *Behavior Research Methods* published by the Psychonomic Society.

## Bill Lammers
*University of Central Arkansas*

Bill Lammers received his B.A. in Psychology from San Diego State

University and his Ph.D. in Experimental Psychology from Bowling Green State University. As an undergraduate student, Dr. Lammers was mentored by Dr. R.H. Defran as they conducted research on South American parrots. As a graduate student, Dr. Lammers was mentored by Dr. Pete Badia as they conducted psychophysiological research to assess hearing during sleep, memory during sleep, olfaction during sleep, behavioral responding during sleep, and brain measures of learning during waking.

Dr. Lammers has been a professor in the Department of Psychology & Counseling at UCA for 17 years. He is the recipient of the UCA Teaching Excellence Award and an international award for Innovative Excellence in Teaching, Learning, and Technology. His current research interests include the role of technology in teaching, the types of teaching techniques used in the university classroom, the quality of various teaching techniques, the factors that most influence student learning, and student's perceptions of outstanding teachers. In 2005, he co-authored, with Badia, a research design textbook entitled *Fundamentals of Behavioral Research*.

Dr. Lammers mentors graduate teaching assistants, teaches a variety of undergraduate courses, conducts an informal seminar to prepare students for graduate school, and accompanies many students each year to the Arkansas Symposium for Psychology Students and the meeting of the Southwestern Psychological Association.

## Christopher T. Lind

*University of Wisconsin-Eau Claire*

Christopher Lind is Assistant Vice Chancellor, Emeritus at the University of Wisconsin-Eau Claire. He retired from the university in 2006 after holding positions of Assistant Dean of the Graduate School and Office of University Research, Director of the Center of Excellence for Faculty and Undergraduate Student Research Collaboration, and Assistant Vice Chancellor for Research and Sponsored Programs. Dr. Lind received his BA in Biology from St. Olaf College and his MA and PhD in Plant Ecology from the University of Wisconsin-Madison. His research, teaching, and administrative career spanned nearly 40 years.

Prior to coming to the university he served as an officer in the US Air Force with assignments including Research Biologist at the Air Force Aerospace Medical Research Laboratory, Biotechnology Liaison Officer at the European Office of Aerospace Research and Development in London, UK, Life Sciences Program Manager at the Air Force Office of Scientific Research, and Director of Science at the Air Force Systems Command Headquarters.

Dr. Lind held memberships in the Ecological Society of America, Sigma Xi, the National Council of University Research Administrators, and the Society of Research Administrators. He was an elected Councilor for the Council on Undergraduate Research and continues as an emeriti member of many of these organizations.

## Britton Mace

*Southern Utah University*

Britt Mace is an Associate Professor in the Department of Psychology at Southern Utah University, where he has taught since 1999. Dr. Mace teaches Environmental and Social Psychology, Environmental Studies, and a field studies course in the National Parks. In addition to teaching, Dr. Mace serves as the Chair of the Institutional Review Board. Dr. Mace received his B.A. in 1992 from California State University, Chico. Both his M.S. in 1997 and his Ph.D. in 1999 were awarded from Colorado State University in Experimental Psychology, with emphases in Environmental and Social Psychology, where he worked with Paul Bell and Ross Loomis.

Dr. Mace has maintained an active research program at SUU, often working collaboratively with undergraduates on a variety of applied environmental and social psychological topics. Over the past few years, Dr. Mace has mentored more than 20 undergraduate student papers presented at regional and international conferences. Britt has served a consultant with the National Park Service for over a decade, with his work on soundscapes receiving several grants. His research has been published in such respected journals as *Environment and Behavior, Society and Natural Resources,* the *Journal of Park and Recreation Administration*, and the *Journal of Applied Social Psychology.*

## Mitch Malachowski
*University of San Diego*

Mitch Malachowski is professor of chemistry at the University of San Diego. He received a B.A. degree in chemistry from Rhode Island College in 1977 and a Ph.D. in organic chemistry from the University of North Carolina at Chapel Hill in 1983. During 1992 he was a visiting professor at Leiden University, the Netherlands and in 2005, at the University of California at San Diego. Mitch served as Associate Dean of Arts and Sciences at USD from 1989-1994.

Dr. Malachowski maintains an active research program in bioinorganic chemistry and supramolecular chemistry and has received funding from the NSF, the Petroleum Research Fund and the Research Corporation. During his time at USD, he has worked with 75 research students and has published over 50 papers, many of them with undergraduate co-authors. Along with his chemistry research, Mitch also has a long-standing interest in the history and philosophy of science and science pedagogy. He has published papers on the work of Sir Isaac Newton, the use of models in science, research vs. student-oriented scholarship, promoting research in non-science areas, and starting a research across the curriculum movement.

Dr. Malachowski was president of the Council on Undergraduate Research from 2002 to 2003 and has taken on many roles in the organization. Mitch has received several awards including one for teaching excellence from the University of North Carolina, the administrator of the year award at USD, the 1999 Davies Award for Teaching Excellence at USD, two University Professorships from USD and the Charles B. Willard award for distinguished career achievement from Rhode Island College.

## Michelle Mamberg
*Hanover College*

Michelle Mamberg is Visiting Assistant Professor of Psychology at Hanover College. Dr. Mamberg received her Ph.D. in Clinical Psychology from Clark University. She received Post-Doctoral training at Pace University's Counseling Center (Pleasantville, NY) and administered a Project Liberty site which provided education and counseling to New Yorkers on the first anniversary of 9/11. Dr. Mamberg taught Group Dynamics and graduate-level Psychopathology at John Jay College of Criminal Justice (City University of New York) before arriving at Hanover where she teaches Personality Theories, Trauma & Loss and Basic Principles of Psychology. Dr. Mamberg's research interests include the discursive analysis of "responsibility" as well as constructions of self and other, in identity narratives. Her clinical work focuses on issues of anxiety and depression, incorporating a relational dynamic approach with mindfulness techniques.

## Diane Martichuski
*University of Colorado at Boulder*

Diane Martichuski is a Senior Instructor at the University of Colorado at Boulder. She received her Ph.D. in Social and Environmental Psychology from Colorado State University. She taught at Weber State University and Wayne State College (Wayne, NE) before landing at the University of Colorado at Boulder in her teaching position. She does not have a research focus, but instead, she mentors undergraduate honors students on independent thesis projects, and organizes undergraduate research teams, who do independent research projects. She has sponsored many of these students who have presented at professional conferences.

Dr. Martichuski teaches over 400 students each semester. She currently teaches General Psychology, Statistics and Research Methods, Social Psychology, Social Research Methods, and Honors Research Methods Seminar. She won the Department of Psychology Faculty Teaching Award in 2000, and a University Residence Life Academic Teaching Award in 2002. She is co-advisor of the CU-Boulder chapter of Psi Chi, and has been the Rocky Mountain Psychological Association (RMPA) Program Chair since 2003. She also has been an RMPA submission reviewer since 2001, and was on the Regional Psi Chi Steering Committee from 2001-2003. She has presented on the RMPA GLBT panel since 1996, and has also made presentations for Psi Chi events at CU-Boulder and RMPA. She won the RMPA Distinguished Service Award in 2005.

## John Mateja
*Murray State University*

John Mateja is an experimental nuclear physicist with research interests is in the area of light heavy-ion reactions. After earning his B.S and Ph.D. degrees from the University of Notre Dame in 1972 and 1976, he was a post-doctoral research associate at Florida State University. Subsequent to this appointment, he became a member of the physics faculty at Tennessee Technological University where he developed one of the first research programs in the nation to involve physics undergraduates in research. In 1988, he joined the staff at Argonne National Laboratory where he had oversight responsibility for all college outreach programs that approximately 700 college level participants in research positions at the lab annually.

In 1994 John joined the staff at DOE headquarters to co-manage a new grant program to assist non-competitive states to become more grant competitive for federal research funding. John assumed the position of Dean of the College of Science, Engineering, and Technology at Murray State University in 1998. During his three year tenure as Dean, the College successfully competed for a $1.5 million Howard Hughes Medical Institute award, an $800,000 NSF Collaborative Research at Undergraduate Institutions award, three NSF Course, Curriculum and Laboratory Improvement grants totaling over $600,000, and a $1.5 million NSF Experimental Program to Stimulate Competitive Research award. Today, he is the Director of Murray State's Undergraduate Research and Scholarly Activity (URSA) and McNair Scholars Program offices. The mission of the URSA office is to grow undergraduate research and scholarly activity across the entire campus. The McNair Scholars Program, supported by an $880,000 award from the U.S. Department of Education, encourages undergraduates from disadvantaged families to pursue doctoral degrees.

For over 20 years, John has been a leader at the national level of the movement to incorporate undergraduate research and scholarship into the undergraduate educational experience. He has been the President of the Council on Undergraduate Research and the Chair of the American Physical Society's Committee on Education. In 2006, he was made of Fellow of the Council on Undergraduate Research.

## Richard L. Miller
*University of Nebraska at Kearney*

Rick Miller received his B. S. from Weber State College and his M. A. and Ph. D. in social psychology from Northwestern University. He has taught at Georgetown University and the University of Cologne. He served as Director of the Community Learning Centre at the Colegio Internacional de Baleares in Spain, and for many years was the Director of applied behavioral science research projects for the Human Resources Research Organization (HumRRO) in Heidelberg, Germany. Since 1990, he has held the position of professor and chair of the Psychology Department at UNK, where he also serves as Chair of the Institutional Review Board.

Dr. Miller is the special topics editor for the *Journal of Psychological Inquiry* and was the editor of the special edition on college teaching of the *Platte Valley Review*. He is a Fellow of the American Psychological Association and the American Psychological Society. Currently, he serves as a regional coordinator for the society for the Teaching of Psychology (APA Division 2). He has been a member of the Rocky Mountain Psychological Association Executive Board since 1993, serving as program co-chair for several years. He was elected RMPA President in 2000, and received the RMPA Distinguished Service Award in 2003.

He is committed to promoting undergraduate student research and during his tenure at UNK has sponsored 140 presentations at regional conferences and 24 journal publications by undergraduate students. Dr. Miller is the recipient of several awards for teaching excellence including the 1997 University of Nebraska system award for "Outstanding Teaching and Instructional Creativity" and the Leland Holdt Distinguished Professor Award.

## Gwen Murdock
*Missouri Southern State University*

Gwen Murdock is Professor of Psychology at Missouri Southern State University. In addition to her own teaching duties, she has served as Department Head since

2001. Dr. Murdock received her Ph.D. in Experimental Psychology from Georgia Institute of Technology. She taught at George Mason University (Virginia) and University of the District of Columbia (Washington DC) before joining the Missouri Southern faculty.

Dr. Murdock won Missouri Southern's Outstanding Teacher Award in 1992. She has supervised innumerable award winning undergraduate student projects and theses. Several of these projects have resulted in students' publications. She is a founding Associate Editor (1996-2004) of the undergraduate research journal, *Journal of Psychological Inquiry*. Her interest in travel and global issues led to her involvement in international education and work with Missouri Southern's Institute for International Studies, where she has led student groups to India and Cuba. She has also served the Institute by analyzing its assessment data.

Dr. Murdock is a comparative psychologist. Her research interests include the social behavior of bovid species. She has conducted naturalistic observations of bison at Prairie State Park in Liberal, Missouri as well as bison and wolf interactions at Wolf Park in Battleground, Indiana. She conducted her sabbatical research at Mikumi National Park in Tanzania, where she observed sable antelope, wildebeest and hartebeest.

## Michael E. Nelson
*University of Wisconsin-La Crosse*

Mike Nelson received his B.S. in 1965 from Fort Hays State University (KS) and participated in an undergraduate research program as a geology major. He received an A.M. from the University of South Dakota and a Ph.D. from the University of Utah where he was a NDEA Title IV Fellow; both degrees were in geology. Dr. Nelson joined the faculty of Fort Hays State University in 1970, became Chair of the Department of Geosciences in 1973, and Interim Dean of the College of Arts and Sciences in 1991. At FHSU he taught courses in paleontology and stratigraphy, supervised numerous undergraduate research projects and M.S. theses.

His research, and the majority of his students' fieldwork, was centered in the Intermountain West-Utah, Wyoming, Nevada, and Idaho. In 1991 he was appointed Head (Dean) of the Division of Science at Truman State University, the public liberal arts and sciences university of Missouri. On 1 July 1998 he assumed the position of Dean of the College of Science and Health at the University of Wisconsin-LaCrosse and retired from that post in the summer 2006. He now resides in Colorado Springs, Colorado. Dr. Nelson is a past president of the Kansas Academy of Science, has been active in the Society of Vertebrate Paleontology, the Council on Undergraduate Research (Secretary, Past-President, At-Large Councilor, facilitated at the CUR Institutes Institutionalizing Undergraduate Research, and The Vital Faculty: Issues After Tenure), has presented at several Project Kaleidoscope workshops, and has served two, three year terms (Treasurer) on the National Conferences on Undergraduate Research Board of Governors. He also has traveled extensively around the country presenting lectures and workshops detailing the benefits of a strong and viable undergraduate research program. Today, his interests in hiking, camping, biking and fishing occupy significant segments of time; however, his passion for undergraduate research remains strong.

## Jennifer L. O'Loughlin-Brooks
*Collin College*

Jennifer L. O'Loughlin-Brooks serves as Professor of Psychology and as an advisor for Psi Beta National Honor Society at Collin College. She currently teaches Introductory Psychology, Life-Span Psychology and Human Sexuality. She received her M.S. in Experimental Psychology from Emporia State University and graduated from Texas Christian University with a B.A. in Psychology and Speech/Communications. Since 1999, O'Loughlin-Brooks has cultivated student scholarship through undergraduate research and student presentations at national and regional conferences. She has supervised award-winning undergraduate research presentations with several resulting in student publications. Research areas have included civic engagement, lucid dreaming, road rage, sexuality, service-learning and criminal behavior. O'Loughlin-Brooks is currently serving as an Associate Editor for the *Journal of Psychological Inquiry.*

The Council for Advancement and Support of Education (CASE) and the Carnegie Foundation for the Advancement of Teaching named Jennifer O'Loughlin-Brooks the 2006 Texas Professor of the Year. She developed the first Honors Introductory

Psychology Course at Collin, as well as the first Introductory Psychology Service-Learning Philanthropy course. O'Loughlin-Brooks was recognized as Collin's Outstanding Professor in 2004 and 2006, and she is a five-time recipient of the Faculty Recognition Scholarship for Exemplary Teaching and Service. Currently serving as Vice-President of the Southwest Region of Psi Beta National Honor Society, her interest in facilitating undergraduate research led to the co-founding of the organization's Psychology Synergy Conference in 2006.

## Beth A. Pontari

*Furman University*

A social psychologist, Beth Pontari received her BA degree in psychology from Colgate University and her M.A. and Ph.D. degrees in psychology from the University of Florida. She joined the faculty at Furman University in 2001 and teaches General Psychology, Experimental and Statistical Methods, Social Psychology, and a seminar on Self and Identity. Beth's area of research is self-presentation and impression management. She examines the underlying processes involved in self-presentation and their relationship to the success or failure of impression management. She also investigates how impression management is not something people do only for themselves, but rather how friends and partners may help each other come across well to others. Beth also applies these areas to the study of the socially anxious or those who have difficulty with self-presentation. Her research has been published in well-known social psychological journals and has been featured in the popular press. Beth is also a regular reviewer for numerous psychological journals.

## Vincent Prohaska

*City University of New York*

Vincent Prohaska is an Associate Professor of Psychology at Lehman College, the City University of New York (CUNY). Established in 1968 as CUNY's only 4-year college in the Bronx, the Lehman student body is overwhelmingly Hispanic, African American and nontraditional. Dr. Prohaska earned his Ph.D. in Educational Psychology/Child Development from the University of Chicago.

Dr. Prohaska's research interests include memory, specifically memory for when events occurred and memory illusions ("false memories" for events that never happened) and the assessment of teaching and learning. At Lehman, he has sponsored numerous undergraduate honors projects, many of which his students have presented at conferences.

Dr. Prohaska has served as Eastern Regional Vice President of Psi Chi (The National Honor Society in Psychology), and in 2007 is Psi Chi National President. He also has served as a Councilor for the Council on Undergraduate Research (CUR) and as a member and chair of the Instructional Research Awards Task Force of the Society for the Teaching of Psychology (STP – Division 2 of APA). In 1997, he received the Lehman College Excellence in Teaching Award. In 2000 he received the Psi Chi Florence L. Denmark National Faculty Advisor Award and in that same year his chapter received the Psi Chi Ruth Cousins National Chapter Award.

## Lizette Royer

*University of Akron*

Lizette Royer is the reference archivist at the Archives of the History of American Psychology at The University of Akron in Akron, Ohio. She earned her bachelors in Psychology at The University of Akron and her master's in Library and Information Science at Kent State University. She will begin work on a second masters in history at The University of Akron in 2008.

In 2006 and 2007 she worked as a teaching assistant in the undergraduate History of Psychology course designing projects and assignments that incorporated the use of primary source documents and other archival materials. She is set to teach the course as a special instructor in the spring 2008 semester. Lizette's research interests include information literacy and the use of primary source material in the classroom as well as race and racism in psychological theory and practice.

## Linda Rueckert
*Northeastern Illinois University*

Linda Rueckert is an Associate Professor of Psychology and Director of the Office of Research Development at Northeastern Illinois University. She received her doctorate in Biopsychology from the University of Chicago. Dr. Rueckert is an active member of the Council on Undergraduate Research and former Chair the CUR Psychology Division. In addition to the assessment of student research outcomes, Dr. Rueckert's research interests include the role of the right cerebral hemisphere in attention and visuo-spatial function, and gender differences in empathy.

## Robert F. Rycek
*University of Nebraska at Kearney*

Bob Rycek is a Professor of Psychology and the Associate Dean of the College of Natural & Social Sciences at the University of Nebraska at Kearney. He received his B.A. in Psychology from the University of Illinois, Chicago, an M.A. in Psychology from Northern Illinois University, and his Ph.D. in Developmental Psychology from Northern Illinois University.

Dr. Rycek's research interests focus on cognitive development including work on conditional logic problem solving and changes in memory strategies with age. More recently, Dr. Rycek has been studying adolescent egocentrism as well as adolescent peer group interactions. He has published articles in *Developmental Psychobiology*, the *Journal of General Psychology*, and *Adolescence*, among others and has published ancillary materials for a number of developmental textbooks.

Dr. Rycek was the Founding President of the Nebraska Psychological Society and has been active in a number of professional organizations. He is currently serving as the Secretary of the Rocky Mountain Psychological Association and is in his second term as an elected councilor in the Psychology Division for the Council on Undergraduate Research (CUR). Several times he has served as the convention coordinator for both the Great Plains Students' Psychology Convention and the Nebraska Psychological Society - Association for Psychological and Educational Research in Kansas Joint Conventions. Dr. Rycek has been an associate editor and is currently co-editor of the special topics section for the *Journal of Psychological Inquiry.* Dr. Rycek received the 1999 College of Natural & Social Sciences Award for Faculty Mentoring of Undergraduate Student Research, the 1999 UNK Faculty Mentoring of Student Research Award, two UNK Creative Teaching Awards (2000, 2001), the University of Nebraska Outstanding Teaching and Instructional Creativity Award in 2001, and the Pratt-Heins Faculty Award for Excellence in Service in 2004.

## Bryan K. Saville
*James Madison University*

Bryan Saville is an assistant professor in the Department of Psychology at James Madison University, in Harrisonburg, Virginia. He received a B.A. in psychology from the University of Minnesota, a MS in applied psychology from St. Cloud State University, and a Ph.D. in experimental psychology from Auburn University. Dr. Saville's research interests include behavioral decision-making, evidence-based teaching methods, and the experimental analysis of social behavior. He has published over 20 book chapters and journal articles, co-edited four books, and made over 70 conference presentations. His forthcoming book, *A Guide to Teaching Research Methods in Psychology*, published by Blackwell, will be released in early 2008. In 2002, Dr. Saville received the McKeachie Early Career Award for excellence in teaching from the Society for the Teaching of Psychology (STP; Division 2 of the American Psychological Association). From 2003-2006, he co-edited *E-xcellence in Teaching*, a monthly e-column on the teaching of psychology published on the PsychTeacher discussion list. Dr. Saville currently serves as Chair of the STP Teaching Excellence Award Committee.

## Beth M. Schwartz
*Randolph College*

Beth Schwartz is Professor of Psychology at Randolph College. Dr. Schwartz received her B.A. from Colby College, and her M.A. and Ph.D. in cognitive psychology from the State University of New York at Buffalo and joined the

faculty at Randolph College in 1991 where she teaches a number of courses including Cognition, Research Methods, Introduction to Psychology, and the Senior Research/Capstone Course. She also served as Director of Faculty Development at the College from 2000-2007, creating a number of new programs focused on assisting faculty with teaching effectiveness.

Dr. Schwartz's research interests include children's memory development, eyewitness interviewing techniques for young children, as well as various topics in the field of the scholarship of teaching and learning. She has published numerous articles, book chapters, edited texts, and presented many professional presentations in these fields. Her forthcoming book, *Optimizing Teaching and Learning: A Practical Guide to Pedagogical Research*, published by Wiley-Blackwell, will be released in 2008.

Dr. Schwartz is a member of APA's Division 2 (the Society for the Teaching of Psychology), Division 41 (the American Psychology-Law Society), and Division 37 (Society for Child and Family Policy and Practice). In 2000, Dr. Schwartz received the Gillie A. Larew award for distinguished teaching at Randolph College, and in 2005 she received the Outstanding Teaching and Mentoring Award from Division 41

## Roy Smith
*University of Mary Washington*

Roy Smith is Distinguished Professor of Psychology at the University of Mary Washington where he regularly teaches courses in physiological psychology, behavioral genetics, psycho-pharmacology, cognitive neuro-science and research methods as he has for more than three decades. He received his Ph.D. in Physiological Psychology from the University of Pennsylvania.

Dr. Smith has authored and co-authored articles on the behavior genetics of domestication, influences on undergraduate substance abuse, eating disorders, animal communication, mis-attribution of physiological arousal and pedagogy as well as books on alcohol education and cognitive neuroscience. He has received federal grants for innovative approaches to faculty development and undergraduate alcohol abuse programming. He has directed over sixty undergraduate students in independent research projects.

Dr. Smith has served as president of the Virginia Association of Academic Psychologists, president of the Virginia Psychological Association and vice-president of the Virginia Psychological Foundation. He has received the Joan Smallwood Service Award from the Virginia Psychological Foundation and the Topher Bill Service Award from the University of Mary Washington.

## Valerie T. Smith
*Collin College*

Valerie T. Smith has served as Professor of Psychology and Sociology at Collin College since 2001. She additionally acts as an advisor for Psi Beta National Honor Society, overseeing organizational activities and student research projects. She is currently a doctoral candidate in Educational Psychology at Texas A&M University-Commerce. Following the interests of her students, her research has included diverse issues related to sexuality, public policy, community integration and lucid dreaming. Her present research involves of assessment of the relative impact of cultural and cognitive factors on academic outcomes. She also serves as reviewer for *The Journal of Psychological Inquiry,* an outlet for student publication. She is actively involved in Service-Learning and functions as a liaison for the program at Collin. She developed the first program at Collin to integrate Service-Learning and philanthropy in the core curriculum. She was recently recognized for contributions in this area by Texas Campus Compact and was selected as an inaugural Faculty Fellow for the organization.

## George Spilich
*Washington College*

George Spilich is the John Toll Professor at Washington College, where he was a department chair for 21 years. He is a cognitive neuroscientist with special interests in neurodegenerative diseases and the development of multimedia for the teaching of cognitive neuroscience to undergraduates. He earned his B.A. from the University of Wisconsin-Madison, his M.A. from Texas El Paso and his Ph.D. from the

University of Pittsburgh. His teaching interests include General Psychology, Cognitive, Cognitive Neuroscience, Neuroscience Research Methods, Biostatistics, Developmental Psychology, Sensation and Perception and Human Sexuality. He is an APA reviewer of undergraduate psychology programs, has been elected to the Board of Directors of Eastern Psychological Association and was a Fulbright Research Fellow at the Departments of Neurology and Nuclear Medicine at University Hospitals, Zagreb, Croatia. He has published numerous articles, book chapters, edited texts and has presented at professional conferences in the US, Europe and South America.

## Bradley J. Stastny
*Texas Tech University*

Brad Stastny earned his B.A. in psychology from the University of Nebraska at Kearney. He entered the social psychology program at Texas Tech University in 2006 and is currently pursuing his Ph.D. in experimental social psychology and hopes to one day accept a teaching position where he can mentor graduate students. Bradley is a student member of Psi Chi, the Society for Personality and Social Psychology, and the Association for Psychological Science.

Bradley has recently become interested in the complex relationship between magical thinking and the self-serving bias and he is also working with his advisor in order to help determine, via facial electromyography, if individuals are capable of experiencing both positive and negative emotions concurrently.

## Donna Stuber-McEwen
*Friends University*

Donna Stuber-McEwen is Professor of Psychology at Friends University in Wichita, KS. In addition to teaching, she supervises the research of seniors preparing presentations or manuscripts. Dr. McEwen received her B.S. from Missouri Western State University, M.S. from Emporia State University, and Ph.D. from Kansas State University. She taught and served as chair at North Central Missouri College before coming to Friends in 1996.

Dr. McEwen's research interests include academic dishonesty in the virtual classroom, student perceptions of the college experience, and university response to emotionally disturbed students. Since 1992 she has published over 20 articles and made over 20 presentations, many coauthored by undergraduates.

Dr. McEwen's memberships include Southwestern Psychological Association and Council of Teachers of Undergraduate Psychology. She is a Past-President of the Association for Psychological & Educational Research in Kansas and has twice served on the Board of Directors for the Great Plains Behavioral Research Association. During her tenure at NCMC she served as National President of Psi Beta and continues to serve on its Presidents Circle. She was included in *Who's Who Among America's Teachers* in 1996, 1998, 2004, 2005, and 2007 and in 1998 was presented the Outstanding Recent Graduate Award from Emporia State University.

## Roxanne L. Sullivan
*Bellevue University*

Roxanne Sullivan is Professor and Chair of Psychology and Women's Studies at Bellevue University in Bellevue, Nebraska. Dr. Sullivan received her Ph.D. in Cognitive Developmental Psychology from Michigan State University. She has taught at Bellevue University since 1983. During this time, she has devoted her time to developing a supportive environment for undergraduate research endeavors in psychology, as well as across disciplines on the Bellevue University campus. Currently, Dr. Sullivan is the Rocky Mountain Regional Coordinator for CTUP, as well as the Bellevue University campus representative for CUR.

## Holly E. Tatum
*Randolph College*

Holly Tatum is Assistant Professor of Psychology at Randolph College. She received her Ph.D. in Experimental Psychology from the University of Tennessee. After four years of teaching at Colby-Sawyer College in New London, NH, Dr. Tatum joined the faculty at Randolph College in 2004. She teaches Introduction to Psychology,

Research Methods, Health Psychology, and the Psychology of Gender. In addition, she serves as the Women's Studies Coordinator and teaches Women's Studies courses.

Dr. Tatum's research interests are in the areas of health psychology, gender, and pedagogy. Her recent research projects have examined personality correlates of health and well-being including forgiveness, revenge, and humor styles. In addition, she is currently involved in research on gender dynamics in the college classroom. Dr. Tatum enjoys mentoring undergraduate students on their senior research projects and in the summer research program at Randolph.

## Kenya Taylor

*University of Nebraska at Kearney*

Kenya Taylor serves as the Dean of Graduate Studies and Research at the University of Nebraska at Kearney. She received her B.A. and M.S. in Audiology and Speech-Language Pathology from Baylor University and her Ed.D. in Educational Administration from the University of Tennessee.

Dr. Taylor's research interests focus on rehabilitation strategies for the adult hearing impaired, noise induced hearing loss and hearing conservation in agriculture. She is committed to promoting undergraduate research and has sponsored numerous presentations by undergraduate students at national conferences. Dr. Taylor has received several awards for teaching excellence including the 2005 University of Nebraska system award for "Outstanding Teaching and Instructional Creativity" and the UNK Pratt-Heins Foundation award for outstanding teaching.

## Kristina Thielen-Belveal

*Friends University*

Kristina Thielen-Belveal is a senior psychology major at Friends University in Wichita, KS. She has presented research papers at the Association for Psychological & Educational Research in Kansas (PERK) annual conference, and Great Plains Students' Psychology Convention, and has won several research awards. In Spring 2007, Kristina published an article in *PSYCHNews* (department newsletter), about her experiences of presenting at research conventions.

Kristina's research interests are quite broad, covering subjects such as the measurable effects of discrimination against alternative lifestyles, the effects of internet usage on interpersonal relations, the concept of social capital and its influences on recreational choices, and the occupational factors that relate to stress levels in emergency medical personnel.

Kristina is a student member of PERK, as well as the Southwestern Psychological Association. She currently serves as Vice President of the Friends University Chapter of Psi Chi and is an officer for the Psi Chi/Psychology Club Executive Committee. In May 2007, Kristina was awarded the prestigious W.O. Mendenhall Scholarship for Outstanding Junior Woman of the Year. In addition to Kristina's academic pursuits, she is also a volunteer Emergency Medical Technician for the city of Halstead, KS and volunteers for Bentley Primary School and the Head Start Program at Halstead Middle School. Kristina anticipates receiving her B.S. in Human Services/Psychology with a minor in Criminal Justice in Spring 2008 and plans to eventually peruse a Ph.D. in Clinical Psychology.

## Theresa A. Wadkins

*University of Nebraska at Kearney*

Theresa Wadkins is an Associate Professor of Psychology at the University of Nebraska at Kearney. Dr. Wadkins received her Ph.D. in Educational Psychology from the University of Nebraska – Lincoln. She also received a Master's in Clinical Psychology from Fort Hays State University.

Dr. Wadkins' research interests include procrastination, assessment and teaching issues. She has published 11 articles in the past 10 years and presented 36 professional papers. Dr. Wadkins has served as the President of the Nebraska Psychological Society and been a member of the Nebraska Psychological Association, the Rocky Mountain Psychological Association, the Great Plains Behavioral Research Association, Psi Chi, and has been a reviewer for the Journal of Psychological Inquiry. In 2006, she received a UNK Creative

Teaching Award. She has also mentored over 20 student research projects that resulted in state or regional conference presentations.

## Michael Wallace
*Morehead State University*

Mike Wallace works for Morehead State University as an assistant professor of science education where he teaches inquiry-based physical science for elementary teachers and science methods for elementary teachers. He graduated from the University of Missouri in 2002 with a Ph.D. in Science Education and worked with Life Sciences Undergraduate Research Opportunities team evaluating the impact undergraduate research experiences have both in students self-efficacy doing research-related tasks and their desire to pursue advance degrees with an emphasis towards research. He is currently focused on developing a strengths-based science teaching approach for pre-service elementary teachers.

## Mark Ware
*Creighton University*

Mark Ware is a professor of psychology at Creighton University, where he began in 1965. Mark obtained his doctoral degree from United State International University.

Mark is a member of several psychology organizations. He is a Fellow of the American Psychological Association and a Charter Fellow of the American Psychological Society. For 12 years, he served as associate editor for the journal, *Teaching of Psychology*, the only journal devoted to the teaching of psychology at all levels from pre-college to continuing education.

Scholarly work includes numerous publications of empirical articles. He is particularly pleased to have had many students co-author publications and presentations with him. Mark has also edited several books and book chapters. Mark chaired the Committee on Advising at the APA-sponsored National Conference on Enhancing the Quality of Undergraduate Education in Psychology.

Among his proudest recognitions, Mark includes selection for teaching awards from the American Psychological Foundation, APA's Division Two, the state psychological organization, and Creighton University.

Mark lead a group of psychology educators in founding a nonprofit, tax-exempt corporation to produce a refereed journal, *Journal of Psychological Inquiry*, that publishes undergraduate students' research. He has served as the journal's managing editor since its inception in1996.

## Kenneth A. Weaver
*Emporia State University*

Ken Weaver is Professor and Department Chair at Emporia State University, where he has taught for 21 years. Prior to receiving his Ph.D. in Educational Psychology from Columbia University, he was a Peace Corps Volunteer in the Philippines in rural public health for two years and taught 7th and 8th grade science for five years.

Dr. Weaver has published and presented on topics including teaching activities for statistics, preparing a department chair portfolio, inspiring students by promoting student engagement, the challenges of distance education, the development of high school psychology, the value of national standards for high school psychology, and assessing distance learning.

Dr. Weaver, a Fellow of APA, served as the 50th President of the Southwestern Psychological Association and also served as President of the Council of Teachers of Undergraduate Psychology. He founded the Kansas High School Psychology Teachers Workshop; the 13th annual workshop was held in October, 2007. In 2000, he received an APA Presidential Citation for outstanding leadership in support of teaching and learning. In 2002, he received the Robert S. Daniel Teaching Excellence Award from APA's Society for the Teaching of Psychology. He also received the 2001 Psi Chi Midwest Regional Faculty Advisor Award and the 2006 Psi Chi Florence L. Denmark National Faculty Advisor Award.

## Lynn H. White
*Southern Utah University*

Lynn White is an associate Professor of Psychology at Southern Utah University (SUU). In addition to her own teaching duties, she is the director of the Undergraduate Research and Scholarship Program at SUU. Dr. White received her Ph.D. in Physiological and Comparative Psychology from McGill University, Canada, in 1997.

Dr. White's research interests center around topics in health psychology, particularly those from a physiological perspective. These include human lactation and stress related issues. Since 1997, she has (co)authored 31 presentations and publications, the majority of which were undergraduate student-faculty collaborations.

Dr. White has served as an institutional liaison for the Council for Undergraduate Research (CUR) and the Utah Conference for Undergraduate Research (UCUR), as well as the president, vice president, and local chapter faculty sponsor for Region VII of Alpha Chi, a cross-disciplinary national honors society for undergraduate and graduate students. Dr. White was named a Marquis' *Who's Who Among American Teachers* for 2005, 2006, 2007, and a Marquis' *Who's Who in America* for 2007. She received a national distinguished service award from Alpha Chi in 2007.

## William Douglas Woody
*University of Northern Colorado*

Doug Woody is Associate Professor of Psychological Sciences at the University of Northern Colorado. He earned his Ph.D. under Wayne Viney at Colorado State University, and he taught at the University of Wisconsin – Eau Claire before joining the faculty at the University of Northern Colorado. Dr. Woody is deeply invested in teaching and mentoring undergraduate students in his own research and in collaborative work. He conducts research in the teaching of psychology, the history of psychology, and psychology and the law. At the University of Northern Colorado, he teaches a variety of courses at graduate and undergraduate levels including history and systems of psychology, psychology of prejudice, psychology and the law, social psychology, and the graduate seminar on college teaching. He has received early career awards from Division 26 (The Society for the History of Psychology) and the Rocky Mountain Psychological Association, in part for his collaborative work with students. His teaching awards include the Wilbert J. McKeachie Early Career Teaching Excellence Award from the Society for the Teaching of Psychology, the Colorado State University Alumni Association Best Teacher Award, and the University of Northern Colorado Academic Excellence Award for Teaching Excellence in Undergraduate Education. Additionally, he has been named Best Professor by the students at two of the three universities where he has taught.

## William Wozniak
*University of Nebraska at Kearney*

Bill Wozniak received his B.A, from the University of Notre Dame in 1973, his M.A. in 1978 and his Ph.D. in 1981 from Miami University. He is a Professor of Psychology at the University of Nebraska at Kearney, which has been his home institution since 1978. Wozniak considers himself a Generalist, whose research interests have been heavily influenced by his students. In the past 5 years, he has mentored over 20 student papers presented at local, regional, and national conferences. These topics have been wide ranging, including road rage, the restoration effect, the misinformation effect, and the effects of symmetry on ratings of facial attractiveness in dogs.

At UNK, Wozniak has served terms as Chair of the Psychology Department, Director of the General Studies Program and has held a joint appointment in both Psychology and Computer Science and Information Systems. He has received the UNK Pratt-Heins Foundation Award for Outstanding Service in 1998, the RMPA Distinguished Service Award in 1998, the Kearney Chamber of Commerce Outstanding Teaching in Higher Education Award in 1998, and the College Outstanding Faculty Mentor Award in 2001.

## Stephen Dine Young
*Hanover College*

Stephen Young received his B.A. from Miami University (Ohio). He completed his doctoral work in clinical psychology at Clark University and his clinical internship at the Cincinnati VA. He has been a professor at Hanover College since 1997 where he teaches personality, abnormal psychology, and counseling and psychotherapy. He is a licensed clinical psychologist with interests in psychological assessment and major mental illness. His research interests are in narrative identity development, symbolism, qualitative research methods, and audience-response approaches to studying film and popular culture. Recent work includes an article on the representation of psychotherapists in movies and a paper at an international symposium on Bob Dylan. He is currently working on a book based on interviews he conducted in which he asked movie-goers about those movies that have had personal significance for them.

## Tracy E. Zinn
*James Madison University*

Tracy Zinn is an Assistant Professor of Psychology at James Madison University (JMU) in Harrisonburg, Virginia. She earned her BA in psychology from West Virginia University in 1997, and her Ph.D. in industrial/ organizational psychology with a minor in experimental psychology from Auburn University in 2002. After teaching in the Department of Psychology at Stephen F. Austin State University in Nacogdoches, Texas for two years, she accepted her current position at JMU.

In 2007, she received the Early Career Award from the Society for the Teaching of Psychology (STP; Division 2 of the American Psychological Association) and the Junior Faculty Award for the College of Integrated Science and Technology at JMU. At JMU, Dr. Zinn teaches, among others, courses in statistics and research methods, performance management, and industrial/ organizational psychology. In addition, she conducts research on effective teaching practices and faculty and student perceptions of students as customers in higher education.

## Mark Zrull
*Appalachian State University*

Mark Zrull is an Associate Professor of Psychology at Appalachian State University. During a typical year, he teaches courses in Biological Psychology, Research Methods and selected areas of Behavioral Neuroscience as well as collaborating with 6 to 10 undergraduates and 1 or 2 graduate students in his research lab. Dr. Zrull received his Ph.D. in General Experimental Psychology from the University of South Carolina with a major area of study in Behavioral Neuroscience and a minor in Quantitative Psychology. He was a postdoctoral fellow with the Auditory Neuroscience group in the Department of Neurophysiology at the University of Wisconsin in Madison before joining the Appalachian State faculty in 1992.

Dr. Zrull's research uses a model of acquired, reflex epilepsy to examine neural correlates of generalized seizures and of non-seizure behavior altered by seizure susceptibility and frequency. Most of Dr. Zrull's published articles and research presentations include undergraduate and graduate student coauthors, and his undergraduate researcher collaborators have made about 50 presentations at the National Conference on Undergraduate Research over the last 12 years. Dr. Zrull served as Chairperson of the Psychology Division of the Council on Undergraduate Research (2002-2004), helped with efforts to formalize undergraduate research at Appalachian, and continues to be involved with efforts to integrate student-faculty collaborative research into the undergraduate experience through efforts at Appalachian and in the undergraduate STEM community, which includes Psychology, at large.