

Advanced Laboratory Courses in Psychology

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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 to 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 the 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.

References

- Boyer, E. L. (1990). *Scholarship reconsidered: Priorities of the professoriate*. San Francisco: Jossey-Bass.
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- Jacobellis v. Ohio, 378 U.S. 184, 197 (1964).
- McKeachie, W. J. (1999). *Teaching tips: Strategies, research, and theory for college and university teachers (Tenth Edition)*. New York: Houghton Mifflin.

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
Authenticity: True Self vs. Working Self
Attributional Explanations for Failure: Cultural Differences
Analysis of False Memory
Picture Presentation: Are False Memories Associated with Levels of Processing?
Music Performance with Interference
Effects of Background Music on Studying
Effects of Witness Confidence and Veracity on Memory
Effects of Reading Skill and Enjoyment on Proofreading
Influence of Locus of Control on Cancer Treatment Choices
Effects of Source Credibility on Change in Attitudes toward a Paranormal Phenomenon
Urban Legends and the Paranormal: The Correlation of Belief
