

Activities for Engagement in a Psychometric Course

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Psychometrics courses introduce students to the concepts and issues central to psychological assessment. Key to this endeavor is a review of basic statistics along with a more-detailed examination of the statistical concepts most relevant to test design and construction. In addition, many psychometrics courses provide a general overview of the use and application of psychological testing in different domains. As such, a comprehensive psychometrics course will teach students the essential skills relevant to evaluating psychological tests and assessments and the critical thinking skills needed to interpret psychometric findings.

With a central objective of providing students with a basic foundation for understanding the development and purpose of psychological tests, it is not surprising that many students perceive the overall topic of psychometrics to be dry or irrelevant to their professional goals. This lack of enthusiasm for the course material is compounded by the early emphasis on statistics (with a key focus on reliability, validity, and item analysis). Fighting against students' fear, anxiety, or dislike of statistics, instructors must use strategies to engage students and actively involve them in the learning process. Below, we discuss strategies for (a) analyzing psychometric information in the popular media, (b) evaluating the validity of online tests, and (c) constructing effective assessments.

Analyzing Psychometric Information in the Popular Media

To begin a psychometrics course, we focus students' attention on an applied aspect of testing by asking them to analyze psychometric information in the popular media. Specifically, students use popular media sources (e.g., newspaper, magazine, online reports) to locate an article focusing on psychological testing or measurement. The article might discuss the results of a test, introduce a new use of testing, or debate the relevance of testing. A common example used by many students is the "No Child Left Behind" Act. Students then bring their articles to class where we discuss operational definitions that differentiate psychological testing from related forms of testing as

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well as the overlap between various domains of testing and different types of psychological tests. In addition, we critically analyze the articles by discussing any statistical evidence the authors reported along with misconceptions that might be evident. This activity is a nice way to foster students' active discussion of psychological testing and provides an overview of upcoming course topics.

Evaluating the Validity of Online Tests

To promote a clear understanding of the concept of validity, while encouraging students to become more critical consumers of the psychometric information, students analyze the validity of a personality, ability, intelligence, or attitude measure published in a popular online magazine (e.g., *Cosmopolitan*, *Parents*, *Oprah*, *Men's Fitness*) or website (e.g., *Queendom*, *Colorwize*, *Personality Tests*, *Tickle*). Students complete the measure, paying particular attention to issues relevant to the expressed or implied validity of the test. At the completion of their investigation, they must answer and be prepared to discuss the following questions:

1. What type of test did you take (personality, intelligence, ability, attitude, etc.)?
2. What type of validity evidence was presented (either directly or implied)?
3. In your opinion, was this test valid? Explain.
4. Provide a recommendation that highlights a way in which the test developers could demonstrate validity of the measure; identify the type of validity (i.e., content, predictive, concurrent, construct, convergent, discriminant) addressed by your recommendation.

Students report that taking tests is one of their favorite course activities and that comparing the validity evidence (or lack thereof) provides a deeper appreciation for the elements necessary for a test to be relevant and useful.

Constructing Effective Assessments

Students consistently underestimate the challenges inherent in writing effective measurement items. To illustrate this point, the class works

together to write learning objectives relevant to the textbook chapters on item writing and item analysis. Then each student develops a quiz that effectively measures mastery of the specific learning objectives. Students must incorporate a minimum of three different item formats but receive no other guidance in the development of their quizzes. Students then exchange their quizzes with other members of the class and evaluate the relevance of the quiz to the target construct, the quality of the items, clarity of directions, and relevance of the scoring system to the objective of the measure. Using the peer evaluations, students revise their quizzes and then distribute them to 10 classmates. Each student receives the completed copies of his or her quiz and completes an item analysis of the results. Using the item analysis along with peer feedback and personal reflections, each student completes a quiz report that critically analyzes the effectiveness, value, and relevance of his or her quiz for measuring the learning objectives. Students report that this process is much more difficult than they believed it would be. However, they also indicate that they have a better appreciation for the small details that can influence the quality of a question as well as unintentional factors of test design that can hinder the validity and reliability of a measure.

The literature highlights a number of specific activities designed to foster student engagement and active learning in a psychometrics course. The following annotated bibliography provides an overview of classroom resources, empirically tested teaching strategies, class activities, and assessment ideas to promote student engagement in psychometrics.

Activities for General Course Structure

Embedding Demonstrations

Although directed at science classes in general, this article describes the benefits and implications of embedding laboratory-style demonstrations into the classroom. Additionally, it explains how timing (i.e., before, during, or after discussions), purpose, and structures of active demonstrations can aid learning in a science class. Finally, it gives examples of various types and timing of active demonstrations.

- Morgan, J. R., Barroso, L. R., & Simpson, N. (2009). Embedding laboratory experiences in lecture. *Advances in Engineering Education, 1*, 1-31.

Supplemental Materials

This interactive website provides a comprehensive bank of major tests, measures, and scales of varying personality-based psychological

constructs, ranging from adult attachment tests to word association tests.

- Retrieved from <http://personalitypedagogy.arcadia.edu/pmwiki/pmwiki.php?n=Content.Tests>

Evaluation materials

This article describes three measures of student learning in the classroom. The second measure describes an activity that specifically targets students' understanding of interrater reliability. Students receive a worksheet that describes two methodologies for an observational study and asks questions regarding interrater reliability in the data collection methods. A very specific rubric for grading the activity is also included.

- Gottfried, G. M., & Johnson, K. E. (2009). Evaluating students' process knowledge: Measuring understanding of inter-rater reliability. *Assessing Student Learning: A collection of evaluation tools*. Retrieved from <http://teachpsych.org/otrp/resources/resources.php?category=Classroom%20Tips>.

Team-Based Learning

This article describes the benefits of a group project conducted via a lab section and homework assignments. The authors provide a session-by-session account of all aspects of the group project. Students are instructed to create an assessment of a predetermined construct provided by the instructor. Students must operationalize the constructs, create items for the assessment, and conduct item analysis. Finally, students write a research paper with introduction and methodology sections and present their findings in an oral presentation. The authors also present students' and teachers' evaluations of the project.

- Hynan, L. S., & Foster, B. M. (1997). A project for developing tests in a psychological tests and measurement course. *Teaching of Psychology, 24*, 52-54.

Real World Simulation

This article describes two project scenarios in which education students apply their tests and measurements skills to real-life situations. In the first scenario, students pretend that they have to fill in for a teacher who is on extended leave. Students create a syllabus, teaching objectives, activities, homework assignments, and assessments linked with the teaching objectives on various cognitive levels. The second portion of the assignment has students create a teaching philosophy and teaching assessment. The authors include examples of actual student final projects in the article.

- Cochran, K. H. (1995). Teaching assessment of classroom learning: Using scenarios to teach basic tests and measurements concepts. Paper presented at the Annual Mid-South Educational Research Association, Retrieved from ERIC at <http://eric.ed.gov/PDFS/ED392360.pdf>

Virtual Course

The Society for the Teaching of Psychology for Division 2 of the American Psychological Association has produced a webpage (<http://teachpsych.org/otrp/syllabi/syllabi.php?category=Tests>) in which quality examples of syllabi that have been used in actual courses have been posted for use. There are currently face-to-face courses as well as virtual course syllabi for tests and measurement classes. The virtual course syllabi provide a schedule of topics, ground rules for class interaction, additional resources for students, and descriptions of multiple hands-on assignments.

Incorporating Applied Projects

This article describes how the students in a tests and measurements class completed a semester-long project to create a new teacher evaluation form for their university. Through a series of homework and in-class exercises, students collected data, pilot-tested the instrument, used factor analyses to reduce items, and assessed the reliability and validity of the new scale. Through each phase of the research, class lectures and discussions linked the project to key concepts of instrumentation, statistics, and testing and measurement concepts. The author describes each step in the project but also gives examples of in-class exercises, discussion topics, and homework assignments.

- Schwalb, B. J., & Schwalb, D. W. (1990). The design of a college course ratings form by a psychology “Tests and Measurements” course. Paper presented at the Annual American Educational Research Association meetings. Retrieved from ERIC at <http://eric.ed.gov/PDFS/ED320954.pdf>.

Content-Specific Course Activities

Measurement Theory

This article describes a hands-on class activity in which the students measure a metaphor for intelligence. Students first estimate the number of marbles (intelligence) contained in sealed boxes (subjects). Their estimates are then compared to the actual number of marbles. The values from both the students’ estimates and the actual scores are then related back to measurement theory, true scores, and reliability. The author describes the materials

needed, the procedure, and the discussion that the activity entails.

- Wininger, S. R. (2007). Measuring marbles: Demonstrating the basic tenets of measurement theory. *Teaching Statistics*, 29, 57-59.

Reliability

This article describes an in-class activity in which students first form small groups and then receive instructions that they will be rating and grading essays written by “volunteers” from their groups. The groups create keys and rubrics for grading the essays under the guise that doing so will illustrate different scoring methods. In reality, the activity is deceptive because fellow students do not actually write the essays. Rather, each group receives the same essay. A subsequent discussion focuses on reliability, interrater agreements, and bias.

- Gentile, J. R. (2000). An exercise in unreliability. *Teaching of Psychology*, 27, 210-212.

Validity

The authors assessed the effectiveness of a classroom exercise in which students actively create a test and assess its predictive validity. The activity consists of choosing a dichotomous characteristic of classmate (e.g., athlete, musician) to study, breaking students into small groups to create dichotomous test questions, and then having the entire class answer the questions. Test items are discussed and validity is determined. When compared to another introduction to psychology class in which students were taught predictive validity through lecture and discussion, the classroom exercise produced better understanding of predictive validity, higher confidence in testing procedures overall, and more enjoyable classroom atmosphere.

- Wesp, R., & Eshun, S. (2005). Teaching the principles of test validation in Introductory Psychology. *Teaching of Psychology*, 32, 234-236.

Test Construction

This article describes a term project, conducted in a Korean psychometrics course, in which students created an attitudes questionnaire by developing an item pool, collecting data, analyzing results, and writing a report. The objective of the activity is to show students the principles behind scale construction. The article describes each phase of the project and includes evaluation measures. The exercise increased students’ motivation to learn psychometrics, allowed them to benefit from working in groups, and enabled them to see first hand the problem-solving processes involved in psychological

measurement. Additionally, the article includes cross-cultural implications and considerations.

- Webster, S. K. (2001). Teaching psychometrics in South Korea through a Reunification Attitude Scale class project. Paper presented at the Annual American Psychological Association meetings. Retrieved from ERIC at <http://www.eric.ed.gov/PDFS/ED461813.pdf>.

Scaling or Levels of Measurement

This website contains activities, homework assignments, and lectures regarding any topic in psychology. Of those, there are postings for a game that students play in which they read scenarios and choose which level of measurement is being described. The students' worksheet for the game is also posted. The game's description can be found at http://www.psychexchange.co.uk/tag/levels_of_measurement/levels_of_data/

Item Analysis

This article describes an end-of-the-term group project in which students use theories they have been taught to create (e.g., Bloom's taxonomy) in order to evaluate classic tests and create their own tests.

Students use peer evaluation and group discussion to analyze whether test items are accurately assessing the corresponding levels of Bloom's taxonomy.

- Anderson, M. G. (1996). Teaching a test and measurement course by developing a measurement instrument. In *Proceedings of the Annual Conference on Undergraduate Teaching of Psychology*. Retrieved from ERIC at <http://www.eric.ed.gov/PDFS/ED405027.pdf>

Personality Tests

This article describes an in-class activity and homework assignment that takes place over several class sessions. Placed in small groups, students collectively create items that assess some personality construct. Students then have fellow classmates, friends, and family members complete the survey. Students collect the responses and then plot each data point on the board with the instructor's help. Students discuss issues in reliability, validity, test construction and measurement, and defining personality constructs.

- Benjamin, L. T. (1983). A class exercise in personality and psychological assessment. *Teaching of Psychology, 10*, 94-95.