Improving Undergraduate Education in Psychology

Using an End-of-Major Standardized Assessment

and a Teaching Resources Wiki

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ABSTRACT

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Traditionally, appeals for improving the teaching of psychology at the post-secondary level have focused on increasing teacher training and motivation. However, wide-scale success may be limited because both approaches involve significant demands on teachers' time. I describe two recommendations that may improve teaching while requiring minimal time investment from individual teachers. The first is the development of an end-of-major assessment taken by undergraduate psychology majors that would provide valuable feedback to teachers on which areas of the curriculum need improvement. The second recommendation is to create a new database of research on teaching and learning that focuses on streamlining relevant information and improving user-friendliness through the use of a wiki interface. The feedback from the end-of-major assessment would link to the sections of the database that might prove most beneficial for improvement of the curricular areas indicated. Suggestions are provided for immediate implementation of both recommendations.

Keywords: teaching psychology, undergraduate education, standardized testing, wiki

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It is neither controversial nor compelling to suggest that teaching can be improved. The issue revolves less around *whether* teaching should be improved than *how* to achieve its improvement. Undergraduate education in psychology involves several stakeholders (e.g., students, instructors, administrators, professional organizations, etc.), who all have their viewpoints about how to inspire better instructional performance and better learning. Generally, improvement is achieved by appealing to either accountability (e.g., Dunn, Mehrotra, & Halonen, 2004) or responsibility (e.g., Halpern, 2010). However, it is my view that neither of these approaches will adequately improve instruction because they share the same fatal flaw: they do not account for the existing barriers to instructional improvement.

Appealing to accountability may be the most frequent method for motivating teachers to improve (e.g., AAC&U, 2002; Belar, 2007; Maki, 2001; O'Neil, 1992; Spellings, 2006). Calls for increased accountability generally fall into two categories. First, funding sources (federal and state governments, philanthropies, alumni, etc.) want to be sure that their contributions are not being misemployed. Second, interested parties (funding sources, current and future students, future employers, etc.) want to evaluate the claims that a college degree implicitly makes, i.e., that an education at College or University X produces publicly-desired outcomes.

The second approach appeals to responsibility (Halpern, 2004; McGovern et al., 2010). Psychology is a popular undergraduate major in the U.S., in fact, the 8th most popular major, with about 617,000 enrolled students (Snyder, Dillow, & Hoffman, 2008). Additionally, other

majors (e.g., education and health) frequently use psychology courses to satisfy course electives or general education requirements so that roughly one million students take at least one course in psychology each year (Halpern, 2010). With so many academic futures at stake, it would be unfortunate, if not unethical, to neglect the improvement of teaching in the psychology major.

The accountability and responsibility approaches share the same underlying assumption that teachers are not sufficiently motivated intrinsically to improve their teaching. They imply that teachers would do better if only they could be resolutely convinced of how serious the whole business of education is. Although I agree that there is nothing inherently wrong in seeking to motivate teachers to do better, I recognize that even teachers who are convinced and deeply motivated cannot produce measurable improvement in the face of the two largest barriers to improvement: lack of knowledge and lack of time.

These barriers are manifested in several ways. First, a teacher needs to know *whether* improvement is necessary and, if it is, in *what* area of one's teaching it should occur. This requires sufficient time to develop appropriate goals (both improvement goals for the teacher and learning goals for the student) and substantially more time to develop valid assessment of the achievement of those goals. In an informal survey I conducted of almost 200 postsecondary psychology faculty representing over 50 departments, few instructors said that creating assessments was one of their strengths. Rather, the majority of respondents suggested that it was one of their greatest weaknesses (see Appendix A).

Second, a teacher needs to know *how* to improve. This involves searching the literature on teaching and learning, and applying one's findings to one's own students. In fact, this effort may command the bulk of the time required for the improvement of one's teaching. The information available is so abundant as to seem limitless. An online search using "improve

teaching" resulted in over 9,000 references to articles in EBSCO's education database, the Education Resource Information Center (ERIC), nearly 13,000 books at amazon.com, and over 60 million hits at Google. Additionally, many national and regional conferences and national organizations are devoted entirely to the improvement of pedagogy (e.g., the Society for the Teaching of Psychology and the National Institute on the Teaching of Psychology). The enormity of the available resources easily exceeds what one could absorb in a lifetime.

Third, a teacher needs the support of an environment that promotes rather than discourages pedagogical improvement. Because teaching is a learnable skill, implementing more effective teaching activities requires time to develop competence. An environment of support may make such development more likely. Research shows that students often initially react poorly to learning activities that are not traditional, e.g., active learning vs. lecture (Felder & Brent, 1996). Students' lack of knowledge about effective teaching practices may create concern among teachers that they will submit low student ratings or complaints to the department chair. Student ratings often are interpreted incorrectly (McKeachie, 1997). Thus, it is not difficult to imagine a department that is unfamiliar with the growing pains to be expected when altering teaching methods to lack sufficient patience with its teachers, thereby further deterring their efforts to improve.

A closer look at these factors makes clear that the barriers of insufficient time and inefficient access to pertinent resources must be addressed before effective pedagogical improvement can be realized. A teacher simply cannot take advantage of the vast research literature on effective teaching without the time and resources to do so. The issue quickly becomes one of costs and benefits, pitting the desire for improved learning against the time and effort necessary to identify productive ways to achieve it (Sunal et al., 2001). In what follows I

propose that the most effective way to overcome these two barriers is by implementing a standardized end-of-major assessment that directs instructors to a database specifically designed for the improvement of teaching.

A psychology end-of-major assessment (hereafter PEMA) and teaching database fit naturally into the existing framework of the teaching process (see Figure 1). Models attempting to capture the essence of ideal teaching often share two features (e.g., Bernstein et al., 2010; Chew et al., 2010; Fink, 2003; Worrell et al., 2010). The first is a means for assessing the success of one's teaching, usually in terms of student outcomes. The second is that the data on student outcomes feeds back to the selection of learning activities, either through the reevaluation of learning outcomes or by encouraging further inquiry into more effective learning activities. The PEMA-and-database combination fulfills several aspects of the scientist-educator model (see Figure 1).

An obvious application of PEMA is within the second-to-last step of the model: measuring learning outcomes. As mentioned earlier, the valid and reliable assessment of students' achievement in the undergraduate psychology curriculum vis-à-vis learning outcomes is a major challenge for many instructors. An instructor's time constraints and lack of training in psychometrics generally preclude the rigorous measurement of learning outcomes. Thus a potential benefit of a psychometrically valid PEMA is providing valuable data for reflecting on the areas of the curriculum that are strong and those that could use improvement. Several academic majors already employ this program-evaluation format (e.g., nursing and engineering) and therefore may be considered to have the advantage with respect to the last step of the model which involves recognizing areas in need of improvement. This step is critical to designing and implementing more effective learning activities, more appropriate learning objectives, or both.

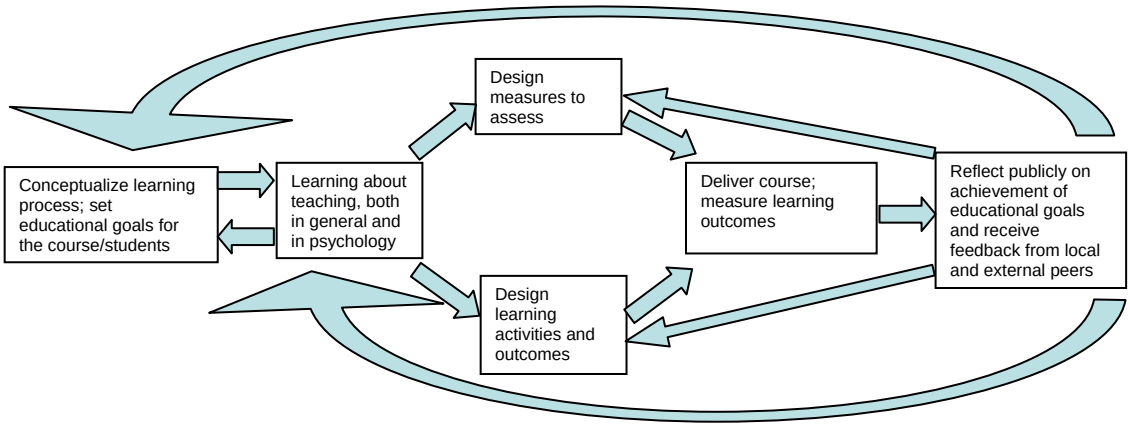

Figure 1. The scientist-educator model of teaching (adapted from Bernstein et al., 2010).

Another benefit of PEMA is that, although it could be used to assess the major as a whole, it can also be utilized to guide individual course development. For example, an instructor could use PEMA as a validity check on her or his in-course assessments. A student's performance in a course on research methods ideally should predict that same student's performance on PEMA questions specific to such methods. If the correlation is weak, the instructor can reevaluate the relevant course content and the assessments she or he uses in the course in order to strengthen the correlation. In this way, PEMA results can provide a reference point for course improvement, allowing such improvement to be more efficient than otherwise.

Not only does PEMA indicate the aspects of a course that may need improvement, but it can also direct instructors to resources on *how* to make improvement. When PEMA identifies an area of the curriculum in which student performance was below the norm or below expectation otherwise, it can provide the instructor with links to the teaching and learning literature. In keeping with the goal of providing the most assistance with the least amount of time invested, the database of literature ideally should have three features: an intuitive user-friendly format, a hierarchical arrangement from broad surveys of the literature to specifically focused research articles, and a community-query feature whereby instructors can raise issues not addressed in the

research literature. These features satisfy both the second step (learn more about teaching) and the last step (reflect publicly on teaching outcomes) of the scientist-educator model of teaching depicted in Figure 1.

The database needs to be designed for the quickest transfer of information. The general model of research-literature databases is a collection of articles that are loosely categorized. Extracting relevant content entails skillfully selecting search terms, such as key words, by which to create a pool of articles that then must be filtered further. This format can be useful if the user is already familiar with the search topic. However it is not as useful for the user who is a novice on the topic. This may be the reality for the majority of psychology instructors on issues pertaining to pedagogy and accounts for why the literature reviews are more popular than research articles per se (Lang, 2009).

The model of the database I propose here is meant to simplify the search process. It begins at the most basic level and moves from there to ever- increasing specificity. Instructors customarily are busy and lack the time to learn about the research in effective teaching with the same rigor that they study their particular research specialty. Therefore, it is important to make the large research literature on effective teaching and learning available in ways that are efficient and that promote implementation most effectively. The next two sections of the thesis explore the PEMA and its link to the database of research literature in fuller detail.

Section I: The PEMA

As previously stated, the problem of determining whether teaching within the psychology major needs to be improved can be addressed by a standardized assessment administered towards the end of the senior year. The American Psychological Association (APA) Board of Educational Affairs has produced a set of guidelines for the undergraduate psychology major (American

Psychological Association, 2007; see Appendix B for the full list of guidelines). The guidelines serve as suggested learning outcomes and provide the framework for what the PEMA will assess and for the feedback it will provide on the improvement of teaching.

Learning outcomes involving writing and research skills are not specific to any one course but rather are a common thread through the entire psychology curriculum. Thus if PEMA provides evidence that students are not learning these more general skills well enough, it provides a warrant for reexamining the thread and revising it with an eye toward assessment outcomes in subsequent years. Additionally, widespread use of the PEMA may provide a quantitative basis for inter-departmental comparisons and may promote dialogue between departments on the improvement of teaching and learning.

The feedback provided by the PEMA also will allow an individual instructor to adjust her or his course over time in response to the outcome data. As a result, over time the effectiveness of teaching across the department may improve. This could occur in at least three ways. First, students learn more when they are tested (Roediger & Karpicke, 2006). Second, teachers receive feedback on the effectiveness of the learning activities they utilize. Third, test results also can inform teachers of their comparative performance—individually and institutionally.

Suppose a student takes the PEMA and scores poorly in experimental methodology. It would be a relatively simple process to go to that student's record of courses and identify the faculty members who taught that student in the courses identified with experimental methodology. Then those faculty members could turn to their own files to determine how the student performed in the courses in question. The PEMA results may allow an instructor to calibrate her or his own classroom assessments more validly. If an instructor gave high grades to students who did poorly on a specific section of the standardized assessment, she or he could

reevaluate the class-specific assessment criteria in order to increase their validity. Or, if there were no in-class measures of the skills or content in question, the instructor could assure their development and utilization in future assessments. Overall, if the majority of students do not perform to the instructor's expectations as indicated by the PEMA results, she or he may use that feedback to examine the course with a more critical eye. Using the PEMA data to reevaluate learning objectives and activities may lead to a gradually more refined analysis of the learning process. Providing instructors with access to the results from a standardized assessment by which to judge their students' progress, and thereby their own performance, may do much to stimulate improved learning and teaching. Given access to the annual PEMA results, each instructor can determine the relative success of her or his teaching and target areas for improvement in ongoing fashion.

With the revision of No Child Left Behind and other initiatives undertaken by current U.S. Secretary of Education Arne Duncan and the Department of Education, standardized testing seems to be growing in favor but still remains a polarizing issue (Hoover, 2010; Popham, 2005; Strauss, 2010; Winerip, 2006). In the survey I referred to earlier, many respondents expressed negative sentiments about standardized testing. Their concerns often centered on how a test's format can create issues of validity. The most common complaint was that multiple-choice formats are inadequate for testing learning objectives, especially those involving research skills and critical thinking (see Appendix A). The pros and cons of multiple-choice formats are well documented (e.g., Katz, Lautenschlager, Blackburn, & Harris, 1990). Positive attributes include the ease of administration and scoring. However, they may not be enough to offset issues of validity when assessing abilities such as critical thinking or creativity.

Another frequent criticism of standardized assessment is that teachers invariably end up "teaching to the test" (Clay, 2008). Generally, this outcome is perceived as the fault of the tests and the larger culture of assessment. Instead, it is argued, teachers' efforts would be better spent helping students "actually learn" instead of simply passing a test (Kohn, 2000). But teaching to a test is problematic only if the test is invalid. Otherwise, teachers succeed when teaching to the test. This is one of the advantages of performance-based assessment. Problems arise when tests attempt to assess outcomes that lie outside their purview of performance. Proper validation of the PEMA vis-à-vis the APA learning outcomes should assuage fears about teaching to the test.

Consider the cognitive dimension of Bloom's revised taxonomy of learning (Krathwohl, 2002) and the skills that define it. Complaints about standardized testing focus on how an over-reliance on multiple-choice items limits assessment to the cognitive skills of remembering and understanding while neglecting other skills, such as application, analyzing, evaluating, and creating. The APA Guidelines also suggest assessing outcomes that may be difficult to evaluate by means of the multiple-choice format. For these reasons, I propose that the PEMA consist of two parts--a portfolio component and an exam component-- that together address all of the skills identified on Bloom's cognitive dimension.

The Portfolio Component of the PEMA

Effective writing is one of the major objectives of an undergraduate program in psychology and is a necessary focus of evaluation. However, in most standardized assessments writing prowess is evaluated using a timed, written essay. This approach may not capture the dynamic of honing a rough draft into a final, polished piece of work (Koretz, 1998). Revisions aside, it is not a common practice in most disciplines, including psychology, to create an original

piece of text under such stringent time constraints. It may be effective as an anti-cheating measure but comes at the cost of validity.

In the professional world, writers are left to their own devices and can ask for help, utilize reviewers, and so on. Engagement in this process may be achieved by assigning a writing portfolio as part of standardized assessment. This device is already common among humanities majors and may be considered a more "authentic" means of assessment (Wiggins, 1990). A portfolio requirement for psychology majors would also address several of the APA Guidelines that are difficult to assess otherwise such as designing a basic study, demonstrating adherence to ethical standards, creativity, research competence, or effective collaboration (Outcomes 2.4, 2.5, 3.2, 6.1, and 7.5, respectively).

The critical issue in prescribing portfolio assignments is determining the types of writing that should be included (Herman, Gearhart, & Aschbacher, 1996). I propose that the student may be best served by creating several writing samples that represent typical professional products in psychology. A portfolio consisting of an empirical research report, a theoretical paper (that includes a literature review), a critique of a published article, and a book review would fall in this category. These products lend themselves readily to class assignments and may allow the student to work on them over the course of several semesters, thereby allowing the time and quality of effort necessary to polish them. Students also should be encouraged to consider submitting their work for publication, especially in journals devoted to undergraduate scholarship. At the very least, a portfolio would provide writing samples for use in graduate school and employment applications. To this end, portfolio requirements may also include a curriculum vitae or personal résumé and a poster or a conference presentation (see Silvia, Delaney, & Marcovitch, 2009).

The Exam Component of the PEMA

The APA Guidelines also suggest critical thinking and a knowledge base of concepts, theoretical perspectives, and the history of psychology as desired outcomes of the undergraduate curriculum. These can be efficiently assessed using a hybrid examination format consisting of several item types.

The first type of item is Assertion-Reason Questioning (ARQ), which is a selected-response format that assesses reasoning rather than recall per se (Williams, 2006). Test-takers are provided a statement of fact and the grounds for that statement. They are required to assess both components of the item—the statement (assertion) and its grounds (reason)—for accuracy and also for whether the latter correctly accounts for the former (see Figure 2 for a sample item). In the example, the answer options refer to the truth or falsity of the assertion and reason, respectively, as well as to the correctness of the reasoning itself [options (a) and (b)].

Assertion		**Reason**
When subjects are asked to memorize a list of 30 words that is then followed by a distracter task, they generally recall the last few words better than the first few words.	**BECAUSE**	The last few words are initially more salient in working memory because they were most recently heard. This is called the recency effect

(a) True; True, Correct reason
(b) True; True, Incorrect reason
(c) True; False
(d) False; True
(e) False; False

Assertion		**Reason**
The bystander effect is when people do not help in an emergency situation if there are other people around.	**BECAUSE**	People tend to attribute behavior to personality in other people and discount the situation (the fundamental attribution error)

(a) True; True, Correct reason
(b) True; True, Incorrect reason
(c) True; False
(d) False; True
(e) False; False

Figure 2. Two examples of ARQ items. The answers are (d) and (b) respectively.

The other proposed item format will be a hybrid that combines the short-answer, traditional multiple-choice, and Discrete-Option Multiple Choice (DOMC) formats. The latter is a computer-based selected-response format designed to address concerns about test-wiseness and security in traditional multiple-choice assessments (Foster & Miller, 2009). Answer options are presented individually, and the test-taker is required to indicate whether the currently displayed option is correct or incorrect before proceeding to the next option. Once an answer is selected, the program skips the remaining answer options and proceeds to the next item.

PEMA test-takers will first have an opportunity to write the correct answer to the item before the answer options are viewed (see Bennett, Steffen, Singley, Morely, & Jacquemin, 1997; Jamieson, 2005) using the DOMC format. If they answer the item in either of these formats, they move on to the next item. If they do not answer, they will have one last opportunity to answer with all of the options displayed simultaneously in the traditional multiple-choice format. A respondent can receive credit for a correct answer depending on the number of formats that were presented. Thus, full credit will be given for correct answers in the short-answer format. Credit will be reduced if the correct answer occurs in the other formats and will be lowest in the traditional multiple-choice format (see Figure 3 for a sample item).

The exam component will be computer-adaptive in order to minimize the time required and to assure precise measurement (Jamieson, 2005; Weiss & Kingsbury, 1984). The procedure also improves test security as well as reducing the time required for test construction (Bennett et al., 1987). Computer-based testing also allows the use of multimedia within items (Dunkel, 1999).

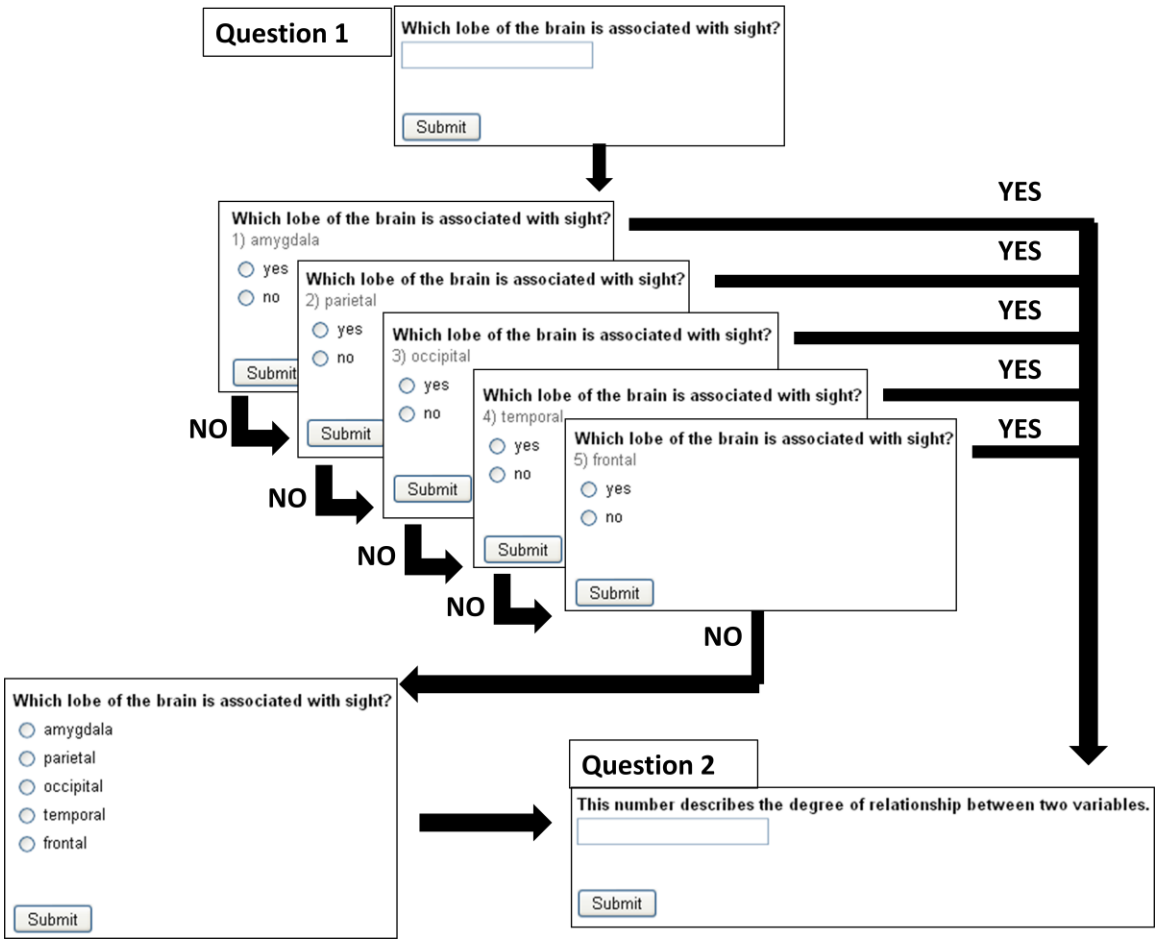

Figure 3. Example of an item that combines short answer, DMOC, and traditional multiple-choice formats.

Several options are available for creating the item pool. Open invitations published in selected journals and other outlets will offer compensation for suitable items. Another approach is that used to develop the nursing major equivalent of the PEMA, the National Council Licensure Examination (NCLEX). The licensure agency arranges periodic training weekends for selected teachers, including payment of their expenses for travel, food, and lodging. The teachers receive training in the development of appropriate exam items and then spend the rest of the weekend developing them. The PEMA could be developed as a research project by a

consortium of colleges and universities or of professional organizations, such as the APA and the Association for Psychological Science.

Factors in the Adoption of the PEMA

According to the U.S. Department of Labor (Stringer, 2000), 42% of psychology undergraduates enter graduate school. Of those who do, only 28% are in graduate programs in the social sciences. That is, only about 11% of psychology majors will go on to graduate school in the social sciences. This fact may call into question whether the requirement of a standardized test is appropriate for students who will not pursue careers in psychology or in a closely related discipline.

First, I maintain that conferring a baccalaureate degree in psychology should be based upon achievement in the study of psychology regardless of the discipline the student may enter after the degree is earned. Second, psychology teaches a way of thinking and interacting with the world that is applicable to more than just professional psychologists (Lehman & Nisbett, 1990; McGovern et al., 2010). For these reasons, I argue that the learning outcomes provided by the APA Guidelines are appropriate for all psychology majors. I should note that half of the Guidelines are not psychology-specific (e.g., communication skills), and of the remaining five objectives, four describe skills that overlap with other disciplines (research skills, critical thinking, applications of psychology, and values).

In addition, my assertion that every psychology major be required to take the PEMA means that the results of the exam can provide useful feedback to the teacher of psychology. By assessing the entire graduating population, the PEMA can avoid any self-selection bias and drive the improvement of instruction in ongoing fashion.

Testing every graduate raises two issues: timing and motivation. In order to evaluate portfolios before graduation, it seems reasonable to expect elements of the portfolio to be submitted prior to the senior year and for the entire portfolio to be submitted prior to enrollment in the senior capstone course described earlier. The exam component of the PEMA can be administered as part of the capstone course. These deadlines should allow certified graders time to evaluate the contents of the portfolio and also minimize the intrusion of the PEMA into students' coursework. Additionally, a portfolio and capstone examination fulfills the Council of Higher Education Accreditation's (2003) requirement for evidence of the achievement of student learning outcomes.

Using the capstone course as the venue for the PEMA administration may also address the issue of student motivation. Because undergraduate psychology does not have a licensure requirement, no external consequences are in place to guard against an apathetic attempt by the test-taker or even outright refusal to take the exam. It may be unreasonable—and possibly unethical—to ask psychology departments to withhold graduation if a psychology major does not pass the PEMA. However, if the exam outcome is part of the final grade in the capstone course, then it is not necessarily any more intrusive than other course requirements. Additional options for increasing motivation may be to attach specific recognitions (e.g., graduation with honors or departmental distinction) and other benefits (such as cash prizes) to success on the exam.

Grading. A study of four large-scale portfolio assessment programs found that the two largest sources of discrepant scores in grading portfolios were, first, non-standardized writing assignments, and, second, disagreement between the raters (Koretz, 1998). Requiring standardized writing tasks that are accompanied by detailed scoring rubrics should decrease the first source of variance. In fact, the APA Guidelines provide a ready basis for the creation of a scoring rubric for the portfolio (see Figure 4 for an example).

Outcome 2.4c – Select and apply appropriate methods to maximize internal and external validity, and to reduce the plausibility of alternative explanations	
4 points	Student used the optimal method to test her or his hypothesis or provided a compelling reason why a less-optimal method was used instead (e.g., cost). Method was implemented correctly.
3 points	The method was not optimal, and no valid reasons for choosing a suboptimal method were given. The method was implemented correctly.
2 points	Student used the optimal method to test her or his hypothesis or provided a compelling reason why a less-optimal method was used. However, it was not implemented correctly.
1 point	The method was not appropriate for the hypothesis and was not implemented correctly.
Outcome 7.1b – Use APA style effectively in empirically-based reports, literature reviews, and theoretical papers.	
4 points	APA style is used correctly throughout the work.
3 points	Minimal errors in APA-style usage that are not readily apparent.
2 points	Several errors in APA-style usage.
1 point	Errors in APA-style usage are frequent and obvious.

Figure 4. An example of how the APA Guidelines can guide the development of a scoring rubric for the portfolio component of the PEMA.

High interrater reliability in portfolio grading often is elusive (Jiang, Smith, & Nichols, 1997; Keller et al. 2004; Koretz, 1998). Keller et al. (2004) described their experience of attempting to implement a portfolio requirement into an undergraduate psychology program. Interrater reliability started low and, within two years, moved to a moderate level. They suggest that initial and ongoing training for graders would result in substantially higher reliability.

Traditional measures of reliability (Pearson correlation, Cohen's Kappa, etc.) treat rater judgments as either categorical or continuous. Because the grading consists of rating several factors on an ordinal scale and then comparing them between raters, a more appropriate statistic for judging reliability should be implemented. Generalizability theory (as opposed to Classical Test theory) is designed to account for different factors (MacMillan, 2000). The most appropriate model for determining the reliability of PEMA portfolio graders is the partial-credit

model. It does not provide the familiar correlation between raters but rather calculates a percentage of the amount of variance due to raters (Jiang & Smith, 2000).

To minimize the variance in portfolio scores, a grading certification program could be implemented. Training would consist of grading sample papers until a predetermined reliability threshold is achieved and maintained. For instructors who have previous experience as members of editorial boards, this should be relatively straightforward. For others, a certification program will provide the opportunity to practice grading while earning continuing education credit and augmenting one's CV. This process could also satisfy departmental mandates of academic service.

Approximately 90,000 students receive a bachelor's degree in psychology each year (Snyder, Dillow, & Hoffman, 2008). In the absence of a professional grading service, the task of grading student portfolios will devolve to instructors. Using Brigham Young University as an example, roughly 250 psychology majors graduate each year over three graduation intervals (fall, winter, and summer). Were half of the students to graduate at one particular point, this would mean that the final grading of 125 portfolios would take place during the immediately preceding semester. On the assumption that the entire portfolio would include no more than 50 pages, practiced graders likely could accomplish the final reading and grading of a portfolio in less than 2 hrs. If 25 members of the faculty were involved, this would mean approximately 10 hrs per faculty member over the semester, or less than 40 min per week.

I recommend that the separate entries in the portfolio be distributed among the graders. This allows each piece to stand alone and not be unduly influenced (for better or worse) by other entries in the portfolio. The evaluation of each entry should involve two graders, ideally from different institutions, thus providing a "checks and balances" system of assessment. In this case,

the amount of time required for grading would be doubled to approximately 80 minutes per week. As the portfolio entries should dovetail with the undergraduate psychology curriculum, it is likely that graders from the student's institution assigned, graded, or advised on the papers previously, thus introducing a possible source of bias. The score on the paper would be the average of the two scores assigned by the graders. In the case of two graders assigning highly divergent scores, the matter could be resolved by involving a third grader. As a further measure of process control, certified graders may be required to periodically recertify.

Halpern (2004) advises against creating an outcome measure that begets curricular homogenization, and several respondents in my limited survey echoed that sentiment. One of the potential benefits of the PEMA is that it can prevent a department's curriculum from becoming too narrow and specialized. Because the APA Guidelines are meant only to be the criterial proficiencies a student should have upon graduation, the proposed assessment should not be difficult for students to do well on, provided students are learning effectively. If these proficiencies are not taught effectively, then the lack of foundational understanding may hamper the student from success in more advanced topics. On the other hand, students with a solid foundation are more prepared to expand their knowledge and skills.

To fully realize the benefits of the PEMA a teacher should correlate her or his final grades with the relevant PEMA category scores. That is to say, a student's research subscore on the PEMA would be correlated with her or his performance in courses that assess research proficiency. This would require the teacher to have an articulated list of outcomes the course is designed to achieve. By making them explicit, the teacher may assure the alignment of the outcomes with the design of the PEMA. As an added benefit, correlated outcomes are readily

sharable with students, a practice suggested as a useful pedagogical technique (McKeachie, 1997).

There are several elements of the APA Guidelines that do not lend themselves readily to a standardized assessment (e.g., 9.2a "demonstrate self-regulation in setting and achieving goals," 9.2b "self-assess performance quality accurately," 9.2c "incorporate feedback for improved performance," and 9.3 "Enact self-management strategies that maximize healthy outcomes"). Formal assessment of these subordinate outcomes may not be necessary because they can be incorporated into the *preparation* for the assessment. That is, it may be assumed that successful achievement of those outcomes will manifest itself through favorable performance on the PEMA and the portfolio requirement.

The last step of the scientist-educator model is to reflect on the learning outcomes in order to inform one's educational goals and knowledge of effective teaching. Research on achieving goals indicates that self-monitoring one's progress leads to improved outcomes (Korotitsch & Nelson-Gray, 1999). Should a teacher find that her or his students consistently score well below the national mean, the discrepancy should provide sufficient motivation to explore more effective ways of teaching and learning.

Section II: The Wiki Database

Studied attention to the PEMA data may assist teachers in identifying areas of potential improvement. At this point it becomes helpful to have resources to turn to. In the scientist-educator model, the peer review of teaching is a critical ingredient. It involves evaluating the effectiveness of learning activities vis-à-vis learning outcomes and then discussing possible means of improvement with peers. As reflected in the model, the ability to evaluate and discuss productively involves knowledge about the science of learning and the science of teaching

(Mayer, 2008). I believe that a teaching-and-learning database with a wiki-style interface can satisfy this goal in a simple yet comprehensive manner.

Whereas the initial surge in Internet use and content was as a storehouse of information, recent developments have taken advantage of the connective possibilities, as seen in the rise of social media, crowdsourcing, and wikis. This second generation of the Internet has been dubbed "Web 2.0" (Thompson, 2007). A wiki is a web-based collaboration tool described as "the simplest online database that could possibly work" (Leuf & Cunningham, 2001, p. 15). Many teachers are already familiar with wiki use in classroom activities (e.g., Bold, 2006; Matthew, & Felvegi, 2009). A wiki database satisfies two goals of the scientist-educator. The first is forging a connection between the results of the PEMA and existing research that is applicable to those results. The second is providing a forum for teachers to discuss teaching, both formally and informally.

Current databases are little more than electronic versions of brick-and-mortar libraries. Extracting information from the collection entails skill in selecting search words to create an initial pool of articles. These articles are reviewed for applicability and may be mined for additional references. The review eventually results in one or more potential applications to the teacher's classroom. This process can be useful if the teacher already has the skills that come with prior use of databases.

Even in cases where such skills exist, teachers are busy and do not often have the extra time to study the research on teaching and learning with the same rigor that they bring to their particular academic specialty. Therefore, it is crucial to make the large literature on effective teaching and learning available in ways that are efficient and that promote implementation most effectively. The existing knowledge base should be laid in comprehensive yet basic fashion and

proceed intuitively to increasing specificity. The new model that I propose is meant to simplify the search process by capitalizing on the previous efforts of psychology teachers through readily available technology.

Wikis are open-source, which means anyone can edit them by adding new content or changing existing content. A wiki article starts when someone with particular expertise creates a page about a specific subject, and future visitors add to and hone existing content. As the article grows it becomes necessary to break the page into several smaller pages to prevent it from becoming unwieldy. As Figure 5 shows, the wiki article on "Psychology" includes a brief overview of "Psychoanalysis" and invites interested readers to visit a separate page devoted entirely to psychoanalysis. Another feature that improves navigability is the option to hyperlink to other articles of relevance. In Figure 5, every word in blue has its own article page(s). These facilitative features allow a teacher to follow a research interest more conveniently.

Psychoanalysis

Main article: Psychoanalysis

From the 1890s until his death in 1939, the Austrian physician Sigmund Freud developed a
on interpretive methods, introspection and clinical observations, and was focused in particu
subjects such as sexuality, repression, and the unconscious mind as general aspects of p
polite society. Clinically, he helped to pioneer the method of free association and a therape

Freud had a significant influence on Swiss psychiatrist Carl Jung, whose analytical psychol
psychologist Erik Erickson, Austrian-British psychoanalyst Melanie Klein, English psychoa
psychiatrist John Bowlby and Sigmund Freud's daughter, psychoanalyst Anna Freud. Throu

Psychoanalytic theory and therapy were criticized by psychologists such as B. F. Skinner

Figure 5. Screenshot from the Wikipedia page on "Psychology" (underlines added to indicate hyperlinks). Retrieved April 20th, 2010.

An integral feature of the wiki database is its dynamic nature. Topics can reflect new findings, reject outdated findings, and address controversies at the speed that this information becomes available, effectively creating a "living" literature review.

Open access raises two obvious concerns: inadvertent or purposeful misinformation. As professionals accustomed to reading a certain level of scientific writing, contributors to the wiki database should bring the same expectation to it. Contributions that make assertions without providing adequate support can easily be tagged with "citation needed" or simply removed ("Help:About," 2010). Sometimes there may be debate about what content to include or what a certain study means for a particular concept. Each article has a tab labeled "Discussion," where users can discuss the content of the page and attempt to resolve disagreements they may have (see Figure 6). However, psychology includes many subjects that engender controversy (e.g., sex differences in mathematical performance), and wiki articles should reflect opposing viewpoints. Ideally, the open nature of the database should inspire more rigor because it opens the peer-review process to more reviewers.

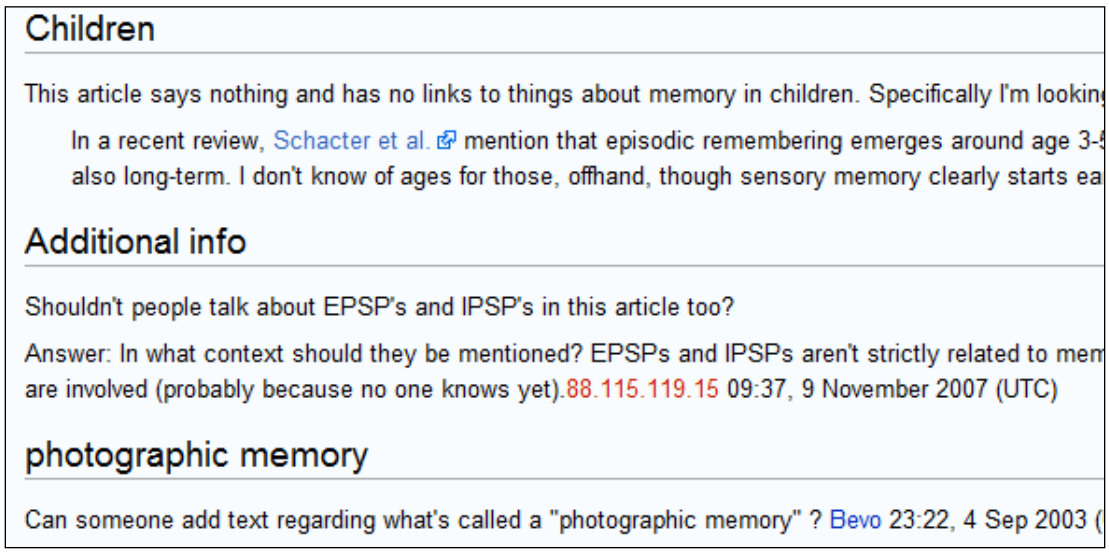

Figure 6. Screenshot of discussion excerpt from Wikipedia article about "Memory". Retrieved on April 20, 2010.

Those who maintain an open-content database must be prepared to deal with spamming, hacking, or vandalism (also known as "griefing" or "trolling"). The wiki model of protection is restorative rather than preventive (Wikipedia:Vandalism, 2010). The traditional database format

reduces misinformation by providing gatekeepers who limit access. This is akin to posting security guards and constructing fences around a wall in order to prevent graffiti. The wiki approach makes it easy to change something but even easier to change it back. Using the same analogy, it is like erecting a wall from which graffiti are washed off readily. Every time an edit is made in a wiki article, the new version of the article is saved in its history. If someone vandalizes a page, a few clicks of the mouse can change it back to what is was previously. There are two ways to monitor changes to pages of interest without having to regularly recheck the page. The first is that every article has a "Watch" tab. By clicking it, the page goes into the user's account. Visiting the watchlist will show all the major edits that have occurred. A user can also follow article pages without having to log in to the site by adding an RSS feed that shows updates in a web browser toolbar. If an article suffers repeated problems, it can be locked from further editing until an accord can be reached. Also, repeat offenders may have their user account or even their IP address (Internet Protocol, a computer's identifier) barred from the site.

The risk involved with open content is offset by the ability of the wiki database to fulfill another component of the scientist-educator model: public reflection and feedback. In order to facilitate this discussion, every formal article page has two links to informal pages. One is to the "Discussion" page. The second is the "Community" page. It is here that teachers can address issues that are not appropriate for the formal pages. Topics may include tips on specific teaching and learning activities, suggestions for future research, etc. Discussion topics may evolve into a formal article page. For example, recent posts on the PsychTeacher listserv (an email forum sponsored by APA Division 2) have asked for help in finding appropriate media resources for a gender studies class, optical illusions to demonstrate visual perception, and empirical research on

using PowerPoint effectively. The resulting discussions demonstrate the possibilities for collective focus and resolution represented by wiki database.

The requests posted to the listserv were for different but readily accessible sorts of information. Media clips featuring gender are hardly rare. Several Web sites house collections of visual illusions (e.g. www.michaelbach.de/ot/index.html; http://www.ritsumei.ac.jp/~akitaoka/index-e.html). And research findings on the use of multimedia, such as PowerPoint, in the classroom are increasing (e.g. Bowman, 2009; Noppe, 2007).

The success of listservs devoted to teaching confirms teachers are quite willing to ask strangers for help through email. Otherwise, the teacher has to find the time to conduct a search, read the results, and evaluate them by critiquing the methodology and envisioning applications. If others have already done the legwork, it makes sense to capitalize on their efforts.

A hypothetical scenario may tie all these features together. Suppose that the results of the PEMA showed that many students in a particular department scored poorly on statistical items or that the statistical procedures used in several portfolios were not entirely sound. Teachers in the department with statistical literacy in their course outcomes may be prompted to look at their course more critically. If a teacher has already correlated course grades to the PEMA results, it should be possible to determine how accurately the grades predicted the results. Based on this analysis, a department might seek to strengthen its students' statistics-related performance by encouraging teachers of other courses that generally do not focus on statistics to now include statistical elements designed to raise student proficiency in specific content areas indicated by the PEMA results. Figure 7 suggests possible next steps for teachers to take.

	GOOD prediction	**POOR prediction**	**Not part of the course**
High PEMA Scores	No need for change	Create more valid course assessments	No need for change
Low PEMA Scores	Improve learning activities	Create more valid course assessments AND improve learning activities	Consider adding the outcome to the course objectives

Figure 7. Suggestions for teachers based on the correlation between course grades and results of the PEMA exam.

Depending on whether a teacher needs to improve assessments, implement more effective teaching activities, or introduce new subject matter, the wiki database will be the place to start. Where there are low PEMA scores but good prediction, the teacher already may have ideas about the most likely areas for improvement. In the case of poor prediction, the teacher can follow wiki links that will lead to more valid course assessments. Teachers for whom predictability was previously irrelevant may now, consistent with departmental imperative, include the objective of statistical literacy in their curricula. To do so, they can follow the wiki links for implementing effective statistical activities into their current course content.

Beginning at the wiki article on the APA Guidelines, teachers could link to articles from the "Goal 2: Research Methods" section. The topic of improving statistical understanding is broad, so there should be summaries of several factors associated with improvement, each leading to a separate article. After reviewing different articles, a teacher may conclude that the important issue of "statistics anxiety" has been unaddressed. The teacher then can visit the "Discussion" page and ask if anyone knows about research on such anxiety and effective ways to reduce it. Other contributors can then update the article appropriately. If the teacher has a question about how a specific activity could be effective in a specific classroom context, she or he can pose that question on the "Community" page. Thus, by connecting the results of the

PEMA to formal and informal research on the improvement of teaching and learning, more sensitive assessment will intertwine with more effective learning activities.

Section III: Next Steps

The Wiki Database

The implementation of the proposed database could begin immediately. The simplest way to begin is to contribute to an existing wiki database. Doug Stenstrom from the California State University, Los Angeles has laid the groundwork at www.PsychWiki.com. It has many of the features I have outlined except for RSS capability and a "Community" page, but both are possible additions. It is a project he started with the vision of becoming the ultimate reference for anything psychological. It differs from the already well-established Wikipedia in that PsychWiki is designed for professionals, while Wikipedia is intended for use by the general public. Another difference is that Wikipedia follows certain in-house rules designed to retain its identity as an online encyclopedia, but PsychWiki can expand by including a variety of articles ranging from encyclopedic formal entries to decidedly informal pages designed by instructors solely for a classroom activity (D. Stenstrom, personal communication, May 19, 2009). There is no limit on space, so it would be possible to post anything that one considers helpful. A teacher can start immediately by visiting www.psychwiki.com and searching for "APA Guidelines" (see Figure 8). From there one can click on entries already in place or can add one's own information.

Currently the site uses mediawiki software, which is what Wikipedia uses. The software still requires html-style coding for features like underlining but, overall, the level of technological prowess required is equivalent to writing an e-mail. Appendix C provides further guidelines for contributing to a wiki article.

In an endeavor of the magnitude I have described, it is important to reach a critical mass of contributors for two reasons. First, the discipline is so large that it would be difficult to provide an adequate database with only a few contributors. Perhaps more importantly, the more contributors, the more unintentional bias is filtered out through the peer-review process, thereby coming closer to an objective summary of the existing research. Additionally, the quality of the informal pages is usually a function of the number of contributors.

The topicality of the write-up one contributes is not important. Every teacher has something she or he knows about teaching that can be useful within the wiki database. Obviously a well-thought-out, well-referenced paragraph would enhance a formal article page, but one could also just write a sentence that stands alone and, as the article builds, subsequent editors will place it in context. Questions about effective teaching and learning can be inserted on either formal or informal pages. Teachers can describe activities they consider effective but that have not yet been subjected to experimentation. Indeed, they could invite collaborators for a joint study. Other contributions could describe class assignments. Teachers could invite students to contribute to a topic page that interests them or practice library-research skills by filling in references for content that is flagged with "needs citation" (Wheeler & Wheeler, 2009).

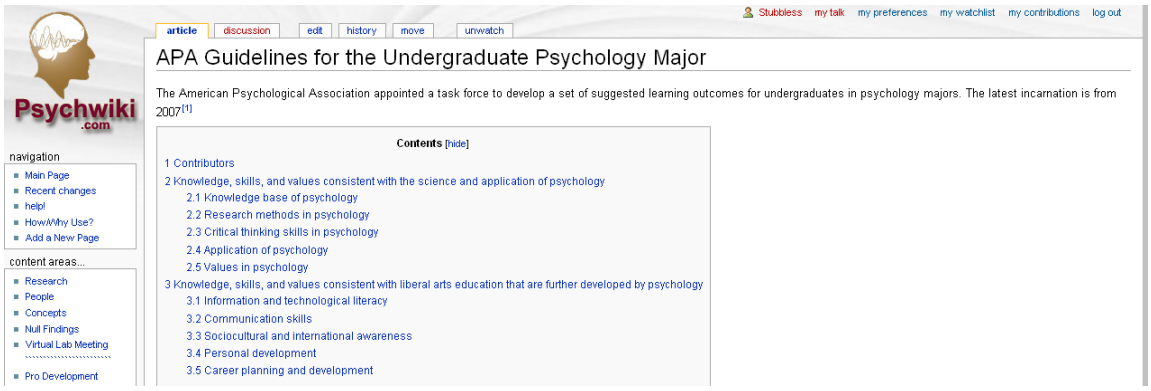

Figure 8. Screenshot of PsychWiki page for the APA learning outcomes.

The PEMA

Although it will take time to create and validate a portfolio rubric and exam, a few options are available to departments in the meantime on order to take advantage of the PEMA premise.

Initiating the portfolio component requires a rubric and little else. The ideal rubric will be validated using the APA Guidelines and written to minimize interrater variance. However, until then, there are several rubrics available online with satisfactory face validity (e.g. www.rcampus.com; Halonen, Bosack, Clay, McCarthy, 2003). A department can also implement a rubric of its own design. Departments should link courses and assignments in a meaningful trajectory so as to ensure that students satisfy APA guidelines by completing the portfolio requirements.

Standardized tests in psychology are already in place and could serve on an interim basis until a more extensive instrument can be constructed. The Educational Testing Service (ETS) publishes two tests that may be useful. The first is the Psychology Major Field Test (MFT)--a standardized assessment of what a psychology major should know upon graduation (see Appendix C for a listing of topics and pricing). Although superficially similar in content to the Graduate Record Examination (GRE) in psychology, its purpose is to measure student outcomes rather than predict performance in graduate school. However, the MFT as the sole assessment may be inadequate (Stoloff & Feeney, 2002). Therefore it could be useful to couple the MFT with a second standardized test, the ETS Proficiency Profile (ETS PP) to further measure critical thinking, reading, and mathematical ability (see Appendix C). Although not constructed with the APA outcomes in mind, it may be worthwhile for future research to address the extent to which

the ETS tests already achieve some of the outcomes. They may be well-suited as interim measures of teaching efficacy related to learning outcomes until the PEMA is available.

Section IV. Conclusion

The process of improving pedagogy, and subsequently student learning outcomes, in the undergraduate psychology major can be made substantially easier and more effective. The large published literature on learning and teaching can be made more accessible. If the PEMA is introduced, the feedback it provides can be used to assess teaching effectiveness and be linked to appropriate research for the improvement of teaching. By taking advantage of Web 2.0 collaboration tools, teachers can substantially improve teaching with a minimal investment of resources and time to their advantage and, more important, to their students' advantage.

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Appendix A

Psychology Instructor Survey Results

When he was serving as president of the APA, Alan Kazdin said, "The challenges before education at all levels are squarely in the domain of psychology. Psychologists are the experts on evaluation" (Clay, 2008, p. 54). Thus it seems reasonable to expect that psychology should be among the leaders in effective teaching. To assess this expectation, I administered a questionnaire to a sample of faculty in leading departments of psychology.

Method

Participants

Using the U.S. News and World Report (August 27, 2007), I identified the top 100 colleges. If the psychology department website at the institution listed email addresses for their faculty, they were included in the sample. This resulted in 2,152 potential participants representing 56 colleges. The questionnaire was emailed to all faculty members on the list. Ninety-four of the emails were returned as undeliverable. Of the remainder, 257 participants started the questionnaire, and 181 finished it.

Procedure

The questionnaire consisted of 19 questions that varied between multiple choice and open-ended answers. The questionnaire was conducted using Qualtrics survey software. The respondents were treated as anonymous.

Key findings

When faculty members were asked how often they used the most effective learning activities, only 14% responded "occasionally" with the remaining 86% responding "often" or

"almost always." When those who answered "occasionally" were asked why they did so, the majority responded that time and resources were factors. When the remaining respondents were asked why other instructors may not use the most effective methods more often, the majority of them responded similarly.

The overwhelming majority of respondents (93%) indicated that, when creating the objectives for their courses, they relied on their own professional opinion. When asked to explain how they chose which learning activities to use, 34% responded that they looked at the course objectives and matched them to learning activities. Time, effort, and resources were mentioned as a consideration by 12%. Only 8% responded that they considered the scientific evidence when selecting the most effective ways to learn.

Respondents were then asked how they typically evaluate their courses for effectiveness. Most (93%) use the student rating forms designed by their institutions, but 69% use some form of informal evaluation such as talking with students or peers, as well. About 30% create and administer formal evaluations they designed. Following is a full summary of responses and the list of colleges and universities contacted for the survey.

1. Thinking of the last junior/senior level class you have taught, please answer the following questions.

Answer	Respondents	%
Yes	241	94%
No *(If selected, skip to #5)*	16	6%
Total	257	100%

2. How often did you use the learning activities you consider most effective?

Answer	Respondents	%
Almost always *(If selected, skip to #4)*	63	27%
Often *(If selected, skip to #4)*	136	59%
Occasionally	32	14%
Never	0	0%
Total	231	100%

3. Why didn't you use the most effective learning activities more often? Select all that apply.

Answer	Respondents	%
I don't know how to implement them	4	15%
I don't have the time or resources necessary to implement them	22	85%
It's not worth the student resistance, negative ratings, or other hassles	4	15%
I don't know what the most effective learning activities are	7	27%
Other (please explain)	1	4%
Total Respondents	26	
Total Responses	38	

4. Why do you feel other teachers may not always use the most effective learning activities?

Answer	Respondents	%
They don't know how to implement them	65	30%
They don't have the time or resources necessary to implement them	140	64%
It's not worth the student resistance, negative ratings, or other hassles for them	86	39%
They don't know what the most effective learning activities are	98	45%
Other (please explain)	46	5%
Total Respondents	219	
Total Responses	435	

5. What guided your selection of course objectives? Select all that apply.

Answer	Respondents	%
I determined the course objectives from my professional opinion	180	93%

I used objectives from other faculty who have taught this course	66	34%
My institution's administration has specified objectives I used	19	10%
I used national standards to inform my objectives	16	8%
Other	4	2%
Total Respondents	193	
Total Responses	285	

6. Briefly describe the considerations that guided your selection of the learning activities you used.

*Answer***	Respondents	%
Outcomes	98	34%
What students like/engages them	47	16%
Experience	39	13%
Time/effort	36	12%
Research	22	8%
Ideas from others	17	6%
My own ideas	11	4%
Size of class	8	3%
Other	8	3%
Coursepack/Provided materials	3	1%
Total Respondents	193	
Total Responses	289	

7. How did you evaluate your teaching in the course? Select all that apply.

Answer	Respondents	%
I didn't evaluate my teaching	5	3%
I evaluated informally using my own impressions or conversation with students (or both)	110	57%
I used the student ratings form provided by my institution	184	95%
I used a formal evaluation that I created	61	32%
I used an alternative evaluation form (please specify)	7	4%
Other (please explain)	6	3%
Total Respondents	193	
Total Responses	373	

8. The following questions ask about your teaching career in general. In what aspect of teaching do you feel strongest?

Answer	Respondents	%
Course design, including learning objectives	83	45%
Selecting learning activities	33	18%
Implementing learning activities	46	25%
Creating assessments	19	10%

Connecting with students	100	55%
Other (please specify)	2	1%
Total Respondents	183	
Total Responses	283	

9. In what aspect of teaching do you feel weakest?

Answer	Respondents	%
Course design, including learning objectives	22	12%
Selecting learning activities	28	15%
Implementing learning activities	26	14%
Creating assessments	90	49%
Connecting with students	20	11%
Other (please specify)	7	4%
None*	5	3%
Time management*	4	2%
Problem students*	4	2%
Total Respondents	183	
Total Responses	206	

10. How do you typically evaluate your teaching? Select all that apply.

Answer	Respondents	%
I don't evaluate my teaching	2	1%
I evaluate it informally using my own impressions or conversation with students or faculty members	126	69%
I use the student ratings form provided by my institution	169	93%
I use a formal evaluation that I created	55	30%
I use an alternative evaluation form (please specify)	8	4%
Other	8	4%
Total Respondents	182	
Total Responses	368	

11. How much involvement does your institution's administration have in your course design?

Answer	Respondents	%
I am solely responsible for the design of the course	163	90%
The administration specifies the learning outcomes I use in the course, but I determine everything else	9	5%
The administration designed the course, I simply offer it	5	3%
Other (please specify)	5	3%
Total	182	100%

12. What specific teacher training have you received? Select all that apply.

Answer	Respondents	%
I took one class on teaching psychology when I was a	48	26%

graduate student		
I took more than one class on teaching psychology when I was a graduate student	17	9%
I have taken one class on teaching psychology since I became a faculty member	8	4%
I have taken more than one class on teaching psychology since I became a faculty member	15	8%
I have utilized a campus teaching and learning center	76	42%
I receive annual peer observations and other feedback on my teaching	53	29%
Only what I have arranged for informally on my own	42	23%
None	25	14%
Observation/experience*	14	8%
Other (please specify)	6	4%
Mentored teaching*	6	3%
Degree in teaching*	6	3%
Conferences*	3	2%
Total Respondents	182	
Total Responses	319	

13. How do you keep up with the latest findings on the teaching of psychology? Select all that apply.

Answer	Respondents	%
I read TEACHING OF PSYCHOLOGY or another teaching journal	45	25%
I attend continuing education courses	25	14%
I am kept apprised through informal conversation	74	41%
I don't actively keep up with latest findings	84	46%
Conferences*	7	4%
Center for teaching/learning*	4	2%
Other (please specify)	3	2%
Listservs/blogs*	3	2%
Total Respondents	182	
Total Responses	245	

14. Assume that an undergraduate psychology major should acquire a psychological knowledge base and proficiency with research methods, critical thinking and writing, and applications of psychology. She or he should also be able to identify values specific to research in and the application of psychology. What is your opinion about implementing a senior competency exam that assessed these outcomes?

Answer	Respondents	%
I think it would be very useful	40	22%
I think it would be somewhat useful	70	38%
I don't think it would be useful	67	37%
I think it would be useful if it assessed a different set of outcomes (please specify)	5	3%

Total	182	100%

15. Please briefly explain your answer to the last question.

*Answer***	Respondents	%
It's a good idea	58	32%
Will it test the appropriate outcomes?	41	23%
Content is too broad	24	13%
It's redundant	21	12%
Too difficult to make/implement	17	9%
Other	12	7%
What would the consequences be?	11	6%
Most graduates don't do psych	9	5%
Too much stress/work for students	7	4%
Teach to the test	6	3%
Generic negative	4	2%
Total Respondents	182	
Total Responses	210	

16. If a senior competency exam were to be implemented, when should it ideally be implemented?

Answer	Respondents	%
In the next-to-last semester of the senior year	84	48%
In the last semester of the senior year	66	38%
Never*	14	8%
Other (please specify)	11	6%
Total	175	100%

17. For how many years have you been offering undergraduate psychology courses?

Answer	Respondents	%
<5	43	24%
5-9	38	21%
11-19	34	19%
20-29	24	13%
30+	43	24%
Total	182	100%

18. What is your area of professional specialty? Select all that apply.

Answer	Respondents	%
Learning, or cognitive psychology	50	27%
Comparative or evolutionary psychology	12	7%
Sensation or perception	20	11%
Clinical or abnormal psychology	54	30%

Developmental psychology	43	24%
Personality psychology	14	8%
Social psychology	34	19%
History of psychology	6	3%
Applied psychology	9	5%
Testing and measurement	22	12%
Industrial or organizational psychology	8	4%
Health psychology	21	12%
Behavioral or cognitive neuroscience/physiological psychology	40	22%
Other (please specify)	30	16%
Total Respondents	182	
Total Responses	363	

19. What is your gender?

Answer	Respondents	%
Female	94	52%
Male	88	48%
Total	182	100%

Figure 9. Complete results of the psychology faculty survey

* Not one of the original answers. New category determined from open-ended responses to the "Other" option.

** All answers were determined from open-ended responses.

Alabama	Michigan
American	Minnesota
Arizona	Missouri, Columbia
Arizona State	Montana State
Brown	Ohio State
BYU	Penn State
California, Riverside	Pennsylvania
California, San Diego	Pittsburgh
California, Santa Cruz	Princeton
Carnegie Mellon	Purdue
Case Western Reserve	Rice
Clark	Rochester
Clemson	Southern Methodist
Colorado	St. Louis
Columbia	Stanford
Connecticut	Syracuse
Cornell	Tennessee
Delaware	Texas
Duke	Texas A&M
Emory	Tulane
Florida	Vermont
George Washington	Virginia
Georgia	Virginia Tech
Illinois, Urbana-Champaign	Wake Forest
Iowa State	William and Mary
Kansas	Wisconsin, Madison
Maryland	Worcester Polytechnic Institute
Miami, Oxford, OH	Yale

Figure 10. List of universities included in the psychology faculty survey. Not all institutions were necessarily represented by respondents.

Appendix B

Suggested Learning Outcomes from the 2002 Undergraduate Psychology Major Learning Goals and Outcomes report

Knowledge, Skills, and Values Consistent with the Science and Application of Psychology

Goal 1. Knowledge Base of Psychology

Demonstrate familiarity with the major concepts, theoretical perspectives, empirical findings, and historical trends in psychology.

Suggested Learning Outcomes

1.1 Characterize the nature of psychology as a discipline.

- a. Explain why psychology is a science.
- b. Identify and explain the primary objectives of psychology: describing, understanding, predicting, and controlling behavior and mental processes.
- c. Compare and contrast the assumptions and methods of psychology with those of other disciplines.
- d. Describe the contributions of psychology perspectives to interdisciplinary collaboration.

1.2 Demonstrate knowledge and understanding representing appropriate breadth and depth in selected content areas of psychology:

- a. theory and research representing each of the following four general domains:
  - (1) learning and cognition

(2) individual differences, psychometrics, personality, and social processes, including those related to sociocultural and international dimensions

(3) biological bases of behavior and mental processes, including physiology, sensation, perception, comparative, motivation, and emotion

(4) developmental changes in behavior and mental processes across the life span

b. the history of psychology, including the evolution of methods of psychology, its theoretical conflicts, and its sociocultural contexts

c. relevant levels of analysis: cellular, individual, group/systems, and culture

d. overarching themes, persistent questions, or enduring conflicts in psychology, such as

(1) the interaction of heredity and environment

(2) variability and continuity of behavior and mental processes within and across species

(3) free will versus determinism

(4) subjective versus objective perspective

(5) the interaction of mind and body

e. relevant ethical issues, including a general understanding of the APA Code of Ethics

1.3 Use the concepts, language, and major theories of the discipline to account for psychological phenomena.

a. Describe behavior and mental processes empirically, including operational definitions

b. Identify antecedents and consequences of behavior and mental processes

c. Interpret behavior and mental processes at an appropriate level of complexity

d. Use theories to explain and predict behavior and mental processes

e. Integrate theoretical perspectives to produce comprehensive and multi-faceted explanations

1.4 Explain major perspectives of psychology (e.g., behavioral, biological, cognitive, evolutionary, humanistic, psychodynamic, and sociocultural).

a. Compare and contrast major perspectives

b. Describe advantages and limitations of major theoretical perspectives

Goal 2. Research Methods in Psychology

Understand and apply basic research methods in psychology, including research design, data analysis, and interpretation.

Suggested Learning Outcomes

2.1 Describe the basic characteristics of the science of psychology.

2.2 Explain different research methods used by psychologists.

a. Describe how various research designs address different types of questions and hypotheses

b. Articulate strengths and limitations of various research designs

c. Distinguish the nature of designs that permit causal inferences from those that do not

2.3 Evaluate the appropriateness of conclusions derived from psychological research.

a. Interpret basic statistical results

b. Distinguish between statistical significance and practical significance

c. Describe effect size and confidence intervals

d. Evaluate the validity of conclusions presented in research reports

2.4 Design and conduct basic studies to address psychological questions using appropriate research methods.

a. Locate and use relevant databases, research, and theory to plan, conduct, and interpret results of research studies

b. Formulate testable research hypotheses, based on operational definitions of variables

c. Select and apply appropriate methods to maximize internal and external validity and reduce the plausibility of alternative explanations

d. Collect, analyze, interpret, and report data using appropriate statistical strategies to address different types of research questions and hypotheses

e. Recognize that theoretical and sociocultural contexts as well as personal biases may shape research questions, design, data collection, analysis, and interpretation

2.5 Follow the APA Code of Ethics in the treatment of human and nonhuman participants in the design, data collection, interpretation, and reporting of psychological research.

2.6 Generalize research conclusions appropriately based on the parameters of particular research methods.

a. Exercise caution in predicting behavior based on limitations of single studies

b. Recognize the limitations of applying normative conclusions to individuals

c. Acknowledge that research results may have unanticipated societal consequences

d. Recognize that individual differences and sociocultural contexts may influence the applicability of research findings

Goal 3. Critical Thinking Skills in Psychology

Respect and use critical and creative thinking, skeptical inquiry, and, when possible, the scientific approach to solve problems related to behavior and mental processes.

Suggested Learning Outcomes

3.1 Use critical thinking effectively.

- a. Evaluate the quality of information, including differentiating empirical evidence from speculation and the probable from the improbable
- b. Identify and evaluate the source, context, and credibility of information
- c. Recognize and defend against common fallacies in thinking
- d. Avoid being swayed by appeals to emotion or authority
- e. Evaluate popular media reports of psychological research
- f Demonstrate an attitude of critical thinking that includes persistence, open-mindedness, tolerance for ambiguity and intellectual engagement
- g. Make linkages or connections between diverse facts, theories, and observations

3.2 Engage in creative thinking.

- a. Intentionally pursue unusual approaches to problems
- b. Recognize and encourage creative thinking and behaviors in others
- c. Evaluate new ideas with an open but critical mind

3.3 Use reasoning to recognize, develop, defend, and criticize arguments and other persuasive appeals.

- a. Identify components of arguments (e.g., conclusions, premises/assumptions, gaps, counterarguments)

b. Distinguish among assumptions, emotional appeals, speculations, and defensible evidence

c. Weigh support for conclusions to determine how well reasons support conclusions

d. Identify weak, contradictory, and inappropriate assertions

e. Develop sound arguments based on reasoning and evidence

3.4 Approach problems effectively.

a. Recognize ill-defined and well-defined problems

b. Articulate problems clearly

c. Generate multiple possible goals and solutions

d. Evaluate the quality of solutions and revise as needed

e. Select and carry out the best solution

Goal 4. Application of Psychology

Understand and apply psychological principles to personal, social, and organizational issues.

Suggested Learning Outcomes

4.1 Describe major applied areas of psychology (e.g., clinical, counseling, industrial/organizational, school, health).

4.2 Identify appropriate applications of psychology in solving problems, such as

a. the pursuit and effect of healthy lifestyles

b. origin and treatment of abnormal behavior

c. psychological tests and measurements

d. psychology-based interventions in clinical, counseling, educational, industrial/organizational, community, and other settings and their empirical evaluation

4.3 Articulate how psychological principles can be used to explain social issues and inform public policy.

a. Recognize that sociocultural contexts may influence the application of psychological principles in solving social problems

b. Describe how applying psychological principles can facilitate change

4.4 Apply psychological concepts, theories, and research findings as these relate to everyday life.

4.5 Recognize that ethically complex situations can develop in the application of psychological principles.

Goal 5. Values in Psychology

Value empirical evidence, tolerate ambiguity, act ethically, and reflect other values that are the underpinnings of psychology as a science.

Suggested Learning Outcomes

5.1 Recognize the necessity for ethical behavior in all aspects of the science and practice of psychology.

5.2 Demonstrate reasonable skepticism and intellectual curiosity by asking questions about causes of behavior.

5.3 Seek and evaluate scientific evidence for psychological claims.

5.4 Tolerate ambiguity and realize that psychological explanations are often complex and tentative.

5.5 Recognize and respect human diversity and understand that psychological explanations may vary across populations and contexts.

5.6 Assess and justify their engagement with respect to civic, social, and global responsibilities

5.7 Understand the limitations of their psychological knowledge and skills.

Knowledge, Skills, and Values Consistent with Liberal Arts Education that are Further Developed in Psychology

Goal 6. Information and Technological Literacy

Demonstrate information competence and the ability to use computers and other technology for many purposes.

Suggested Learning Outcomes

6.1 Demonstrate information competence at each stage in the following process:

- a. Formulate a researchable topic that can be supported by database search strategies
- b. Locate and, choose relevant sources from appropriate media, which may include data and perspectives outside traditional psychology and Western boundaries
- c. Use selected sources after evaluating their suitability based on --appropriateness, accuracy, quality, and value of the source --potential bias of the source --the relative value of primary versus secondary sources, empirical versus non-empirical sources, and peer-reviewed versus non peer-reviewed sources
- d. Read and accurately summarize the general scientific literature of psychology

6.2 Use appropriate software to produce understandable reports of the psychological literature, methods, and statistical and qualitative analyses in APA or other appropriate style, including graphic representations of data.

6.3 Use information and technology ethically and responsibly.

a. Quote, paraphrase, and cite correctly from a variety of media sources

b. Define and avoid plagiarism

c. Avoid distorting statistical results

d. Honor commercial and intellectual copyrights

6.4 Demonstrate these computer skills:

a. Use basic word processing, database, email, spreadsheet, and data analysis programs

b. Search the World Wide Web for high quality information

c. Use proper etiquette and security safeguards when communicating through email

Goal 7. Communication Skills

Communicate effectively in a variety of formats.

Suggested Learning Outcomes

7.1 Demonstrate effective writing skills in various formats (e.g., essays, correspondence, technical papers, note taking) and for various purposes (e.g., informing, defending, explaining, persuading, arguing, teaching).

a. Demonstrate professional writing conventions (e.g., grammar, audience awareness, formality) appropriate to purpose and context

b. Use APA style effectively in empirically-based reports, literature reviews, and theoretical papers

7.2 Demonstrate effective oral communication skills in various formats (e.g., group discussion, debate, lecture) and for various purposes (e.g., informing, defending, explaining, persuading, arguing, teaching).

7.3 Exhibit quantitative literacy.

a. Apply basic mathematical concepts and operations to support measurement strategies

b. Use relevant probability and statistical analyses to facilitate interpretation of measurements

c. Articulate clear and appropriate rationale for choice of information conveyed in charts, tables, figures, and graphs

d. Interpret quantitative visual aids accurately, including showing vigilance about misuse or misrepresentation of quantitative information

7.4 Demonstrate effective interpersonal communication skills.

a. Listen accurately and actively

b. Use psychological concepts and theory to understand interactions with others

c. Identify the impact or potential impact of their behaviors on others

d. Articulate ideas thoughtfully and purposefully

e. Use appropriately worded questions to improve interpersonal understanding

f. Attend to nonverbal behavior and evaluate its meaning in the communications context

g. Adapt communication style to accommodate diverse audiences

h. Provide constructive feedback to colleagues in oral and written formats

7.5 Exhibit the ability to collaborate effectively.

a. Work with groups to complete projects within reasonable timeframes

b. Solicit and integrate diverse viewpoints

c. Manage conflicts appropriately and ethically

d. Develop relevant workplace skills: mentoring, interviewing, crisis management

Goal 8. Sociocultural and International Awareness

Recognize, understand, and respect the complexity of sociocultural and international diversity.

Suggested Learning Outcomes

8.1 Interact effectively and sensitively with people from diverse backgrounds and cultural perspectives.

8.2 Examine the sociocultural and international contexts that influence individual differences.

8.3 Explain how individual differences influence beliefs, values, and interactions with others and vice versa.

8.4 Understand how privilege, power, and oppression may affect prejudice, discrimination, and inequity.

8.5 Recognize prejudicial attitudes and discriminatory behaviors that might exist in themselves and others.

Goal 9. Personal Development

Develop insight into their own and others' behavior and mental processes and apply effective strategies for self-management and self-improvement.

Suggested Learning Outcomes

9.1 Reflect on their experiences and find meaning in them.

a. Identify their personal and professional values

b. Demonstrate insightful awareness of their feelings, emotions, motives, and attitudes based on psychological principles

9.2 Apply psychological principles to promote personal development.

a. Demonstrate self-regulation in setting and achieving goals

b. Self-assess performance quality accurately

c. Incorporate feedback for improved performance

d. Purposefully evaluate the quality of one's thinking (metacognition)

9.3 Enact self-management strategies that maximize healthy outcomes.

9.4 Display high standards of personal integrity with others.

Goal 10. Career Planning and Development

Pursue realistic ideas about how to implement their psychological knowledge, skills, and values in occupational pursuits in a variety of settings.

Suggested Learning Outcomes

10.1 Apply knowledge of psychology (e.g., decision strategies, life span processes, psychological assessment, types of psychological careers) to formulating career choices.

10.2 Identify the types of academic experience and performance in psychology and the liberal arts that will facilitate entry into the work force, post-baccalaureate education, or both.

10.3 Describe preferred career paths based on accurate self-assessment of abilities, achievement, motivation, and work habits.

10.4 Identify and develop skills and experiences relevant to achieving selected career goals.

10.5 Demonstrate an understanding of the importance of lifelong learning and personal flexibility to sustain personal and professional development as the nature of work evolves.

Appendix C

Learning Outcomes from the Major Field Test and ETS Proficiency Profile

Major Field Test (MFT)

1) Experimental or natural science oriented areas (about 40% of the questions)
    a) Learning, cognition, and perception (24%)
    b) Comparative and evolutionary (3%)
    c) Sensation and physiology (13%)
2) Social or social science oriented questions (about 41% of the questions)
    a) Clinical and abnormal (10%)
    b) Developmental (12%)
    c) Personality (7%)
    d) Social (11%)
3) Other areas (about 21% of the questions)
    a) Historical (3%)
    b) Applied (3%)
    c) Measurement and methodology (15%)

ETS Proficiency Profile (ETS PP)

Reading/Critical Thinking

Level I

Students who are proficient can:

- recognize factual material explicitly presented in a reading passage
- understand the meaning of particular words or phrases in the context of a reading passage

Level II

Students who are proficient can:

- synthesize material from different sections of a passage
- recognize valid inferences derived from material in the passage
- identify accurate summaries of a passage or of significant sections of the passage
- understand and interpret figurative language
- discern the main idea, purpose or focus of a passage or a significant portion of the passage

Level III

Students who are proficient can:

- evaluate competing causal explanations
- evaluate hypotheses for consistency with known facts
- determine the relevance of information for evaluating an argument or conclusion
- determine whether an artistic interpretation is supported by evidence contained in a work
- recognize the salient features or themes in a work of art
- evaluate the appropriateness of procedures for investigating a question of causation
- evaluate data for consistency with known facts, hypotheses or methods
- recognize flaws and inconsistencies in an argument

Writing Skills

Level I

Students who are proficient can:

- recognize agreement among basic grammatical elements (e.g., nouns, verbs, pronouns and conjunctions)
- recognize appropriate transition words
- recognize incorrect word choice
- order sentences in a paragraph
- order elements in an outline

Level II

Students who are proficient can:

- incorporate new material into a passage
- recognize agreement among basic grammatical elements (e.g., nouns, verbs, pronouns and conjunctions) when these elements are complicated by intervening words or phrases
- combine simple clauses into single, more complex combinations
- recast existing sentences into new syntactic combinations

Level III

Students who are proficient can:

- discriminate between appropriate and inappropriate use of parallelism
- discriminate between appropriate and inappropriate use of idiomatic language
- recognize redundancy
- discriminate between correct and incorrect constructions
- recognize the most effective revision of a sentence

Mathematics

Level I

Students who are proficient can:

- solve word problems that would most likely be solved by arithmetic and do not involve conversion of units or proportionality. These problems can be multi-step if the steps are repeated rather than embedded.
- solve problems involving the informal properties of numbers and operations, often involving the Number Line, including positive and negative numbers, whole numbers and fractions (including conversions of common fractions to percent, such as converting "1/4" to 25%)
- solve problems requiring a general understanding of square roots and the squares of numbers
- solve a simple equation or substitute numbers into an algebraic expression
- find information from a graph. This task may involve finding a specified piece of information in a graph that also contains other information.

Level II

Students who are proficient can:

- solve arithmetic problems with some complications, such as complex wording, maximizing or minimizing, and embedded ratios. These problems include algebra problems that can be solved by arithmetic (the answer choices are numeric).
- simplify algebraic expressions, perform basic translations, and draw conclusions from algebraic equations and inequalities. These tasks are more complicated than solving a

simple equation, though they may be approached arithmetically by substituting numbers.

- interpret a trend represented in a graph, or choose a graph that reflects a trend
- solve problems involving sets; problems have numeric answer choices

Level III

Students who are proficient can:

- solve word problems that would be unlikely to be solved by arithmetic; the answer choices are either algebraic expressions or numbers that do not lend themselves to back-solving
- solve problems involving difficult arithmetic concepts such as exponents and roots other than squares and square roots and percent of increase or decrease
- generalize about numbers, (e.g., identify the values of (x) for which an expression increases as (x) increases)
- solve problems requiring an understanding of the properties of integers, rational numbers, etc.
- interpret a graph in which the trends are to be expressed algebraically or one of the following is involved: exponents and roots other than squares and square roots, percent of increase or decrease
- solve problems requiring insight or logical reasoning

The ETS Proficiency Profile can be administered in either standard or abbreviated form. The standard version requires an average of 2 hrs, and the abbreviated version 40 min. Although both versions provide an equally valid total score, the standard version has the added benefit of

breaking the total score into several subscores for increased feedback (Table 1, "ETS Proficiency Profile: Scores and reports", n.d.). Pricing per test for both the ETS Proficiency Profile and the MFT can be found in Table 3. Standard shipping costs are not included. ETS PP paper tests are ordered in bundles of 25.

Table 1

Pricing for ETS outcome tests

	MFT		ETS PP* (online or paper)	
Amount ordered	Online	Paper	Standard form	Abbreviated form
1-99	$25.00	$27.00		
100+	$24.00	$26.00		
1-499			$15.80	$13.80
500+			$14.80	$12.80

*Adding the additional essay adds $5.00 to the price of each.

To use the existing tests from ETS would cost between $36-$43 per student, depending on the specific configurations. Given the popularity of psychology as a major, using ETS materials could cost many departments several thousand dollars each year were all graduating majors to be tested. For example, at BYU roughly 250 students graduate with a baccalaureate degree in psychology each year. Were all to be tested, it would cost the department between $9,000 and $10,750 annually.