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Flashcards-Plus

A Strategy to Help Students Prepare for Three Types of Multiple-Choice Questions Commonly Found on Introductory Psychology Tests

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A Strategy to Help Students Prepare for Three Types of Multiple-Choice Questions Commonly Found on Introductory Psychology Tests

The first of the Principles for Quality Undergraduate Education in Psychology (American Psychological Association [APA], 2011) asserts that faculty should help their students learn how to learn by providing them with study strategies (i.e., learning techniques) designed to (a) increase their metacognitive skills, (b) engage them in effortful processing, and (c) encourage them to distribute their practice. An excellent resource for teachers of psychology who want to assist their students in this manner is Dunlosky, Rawson, Marsh, Nathan, and Willingham's (2013) astonishingly comprehensive 55-page monograph titled, *Improving Students' Learning With Effective Learning Techniques: Promising Directions From Cognitive and Educational Psychology*, which reviews 495 scientific articles from the psychological literature that have empirically evaluated the efficacy of 10 learning techniques during the past 107 years. The purpose of the pedagogical resource described here is to provide teachers of psychology whose tests contain multiple-choice questions (MCQs) with a study strategy based on practice testing and distributed practice, the two learning techniques recommended by Dunlosky et al. as the most effective of the 10 they reviewed.

MCQs are common in large introductory psychology classes because they are abundantly available in the test banks that accompany introductory-level texts, they can be administered and scored efficiently and objectively, and they enable instructors to assess a broad spectrum of learning outcomes. Much has been written for faculty about the nature of MCQs and the cognitive abilities they can measure (e.g., Gronlund, 1998; Haladyna 1999). However, very little exists in the literature that teachers can share with their students who must answer these types of questions. The purpose of this

resource is to remedy this situation by providing students with a research-based study strategy designed to help them understand, prepare for, and take multiple-choice tests more successfully.

In their book *Assessment Essentials*, Palomba and Banta (1999) stated that MCQs can measure not only the knowledge students acquire, but also higher-order cognitive outcomes such as how well students can “process and use that knowledge” (p. 150). Gronlund (1998) took this assertion one step further by organizing the types of MCQs that can assess these outcomes into three hierarchical categories: knowledge items (that measure the ability to accurately remember previously learned material), comprehension items (that measure the ability to understand remembered material), and application items (that measure the ability to transfer understood material to novel situations in order to solve new problems). In their publication titled *Teaching, Learning, & Assessing in a Developmentally Coherent Curriculum*, APA (2008) supported the use of evaluation methods that measure these categories of cognitive skills when they identified retention, comprehension, application, analysis, evaluation, and creation as the six critical thinking skills undergraduate psychology majors should develop. Forsyth (2003) provided a set of 12 rules that can help faculty write effective MCQs to measure this range of cognitive abilities (e.g., utilize Bloom’s [1956] taxonomy, create plausible alternatives, and minimize all of the above and none of the above items).

Thus, it appears faculty have sufficient resources to write MCQs that can measure a range of cognitive abilities but, as Appleby (2008) stated in an article titled *A Cognitive Taxonomy of Multiple-Choice Questions*, students are unlikely to bring the ability to answer all these types of MCQs to introductory level classes. Perry (1970) described freshman-level students as dualistic in their thinking; that is, they believe that knowledge is either right or wrong in an absolute and concrete way. Students at this level believe that a teacher’s primary purpose is to provide them with facts and then ask them to recognize or recall these facts—in the original form in which they were presented—on tests. Students operating in this stage feel most comfortable with, study for, and perform best on MCQs that test retention of terms and definitions in the same form as they encountered them in their

textbooks and lectures. Their level of discomfort rises dramatically when they discover they must demonstrate increasingly more complex mastery of terms, concepts, principles, theories, and methods with questions that require them to comprehend and apply these types of information.

Vygotsky (1978) introduced scaffolding as an educational method during which students learn from their instructors how to move beyond their current developmental skill set and master more difficult tasks. The strategy described here employs a scaffolding technique whose first step is to meet students at the dualistic level they exhibit when they enter introductory-level psychology classes by reassuring them that (a) their ability to remember (i.e., recognize or recall) factual information in an accurate manner is valued and that (b) this ability will be evaluated by some of the questions on their tests. The second step in this strategy is to make students aware they will also be required to engage in at least two more challenging ways of thinking about the information they will encounter in the class (i.e., by developing an actual understanding of the information they have memorized and applying their understanding of this information to real-life situations involving the behaviors and mental processes they encounter in the textbook and lectures). The third step is to provide them with a learning technique designed to increase their ability to understand, prepare for, and successfully answer MCQs that assess these two higher-order thought processes.

The slides that accompany this introduction familiarize students with three types of cognitive processes their instructors will commonly ask them to use in their classes and then invite them to model the behavior of their instructors by creating flashcards. The flashcards will contain three kinds of information to match the stems and the answers of typical MCQs that measure their ability to think in these ways. The first are verbatim definitions for retention questions, the second are accurate paraphrases for comprehension questions, and the third are realistic examples for application questions.

This strategy employs Dunlosky et al.'s (2013) two most successful learning techniques: practice testing and distributed practice. It involves practice testing because once students have created the flashcards described in the slides, they can use them as practice tests. In the words of Dunlosky et

al., the “merit of practice testing is that it can be implemented with minimal training...for example, students can self-test via cued recall by creating flashcards” (p. 34). This strategy also involves distributed practice because “to-be-learned material is often encountered on more than one occasion, such as when students review their notes and then later use flashcards to restudy the materials” (p. 35). Although flashcards have been traditionally created with paper cards, there is now free or low cost software (e.g., StudyBlue at <http://www.studyblue.com>, Quizlet at <http://quizlet.com>, and FlashCardMachine at <http://www.flashcardmachine.com>) that can be used to create online flashcards, retrieve them anytime and anywhere on mobile devices, and share them online with other class members and the instructor. One of these software packages (StudyBlue) even has an application called Study Reminder that can be programmed to send a text message when it is time to study again, thus allowing students to become aware of, utilize, and benefit from the distributed practice effect.

It is essential to realize that the efficacy of this method is dependent upon students’ ability to paraphrase accurately and generate examples that are both correct and realistic when they create their flashcards. If they paraphrase inaccurately or generate erroneous and/or unrealistic examples, they will learn, but what they will learn will be incorrect. To avoid this unacceptable outcome, instructors should employ strategies that produce opportunities for students’ paraphrases and examples to be vetted by their instructor and/or their fellow students. Faculty can accomplish this in three ways. The first is to encourage students to use the online software packages described in the preceding paragraph. The second is to create online activities in their school’s virtual learning environment (e.g., Blackboard or Oncourse) that require students to share their cards with the rest of their class and request feedback on their quality, accuracy, and realism. The third is to encourage students to seek feedback in the classroom by trading their cards with their classmates, posting them on a bulletin board, or reading them aloud.

A final thought. Faculty might want to recognize the skill of their students who produce particularly well-written paraphrases and real-world examples on their flashcards by posting them

online or on a classroom bulletin board and/or announcing that they will be used to create test items for future classes.

In summary, the method described here is designed to facilitate the accomplishment of the following five recommendations that appear in APA's *Principles for Quality Undergraduate Education in Psychology* because it fosters student acquisition of higher-order thinking skills; encourages faculty use of the results of learning science to enhance student learning; and advocates the identification, promotion, and use of new learning technologies.

- “The psychology curriculum as a whole should be designed to foster high-level learning outcomes that include essential skills such as thinking critically [and] learning effectively” (p. 13).
- “Faculty foster critical thinking by identifying the critical thinking skills and abilities they wish to promote in their classes” (p. 9).
- “The science of learning refers to the body of knowledge about how people learn, including how brains develop and what works to enhance comprehension, retention, transfer, and creative use of information. To be effective educators, faculty should know and apply the principles from the science of learning” (p. 8).
- “Faculty understand and apply a variety of learning principles and modes of learning such as spaced practice, generation of responses, active engagement by students, group exercises and explaining as a way of understanding, among others” (p. 8).
- “Faculty become proficient in their use of commonly used technologies as a means to promote learning, and they encourage their students to develop these proficiencies as well” (p. 11).

You can access the PowerPoint presentation containing this resource by clicking on the following link.

[**Flashcards-Plus Strategy**](#)

UPDATE: Four years after the publication of this resource, the author and three colleagues published the results of their research on the efficacy of Flashcards-Plus. The abstract of this study, which is reproduced verbatim below, indicates that both exposure to and use of this strategy leads to increased academic performance in the form of higher test scores.

Two studies examined the effectiveness of a flashcard-based study strategy, *Flashcards-Plus*, in an ecologically valid context. The strategy requires students to create flashcards designed to increase their ability to retain, comprehend, and apply textbook material to exams. In Studies 1a ($n = 73$) and 1b ($n = 62$), we introduced all students to the *Flashcards-Plus* method and compared their exam scores. Students who used this strategy scored significantly higher than those who did not. In Study 2 ($n = 434$), we randomly assigned six introductory psychology courses to either receive a classroom lecture with the *Flashcards-Plus* strategy (i.e., three experimental courses) or no lecture (i.e., three control courses). Students in the experimental courses scored significantly higher than those in the control courses after the lecture. The results from all three studies demonstrate that students who were introduced to the *Flashcards-Plus* study strategy scored significantly higher on exams following the lecture than students who were not. These findings suggest that this easily implemented teaching strategy can help students achieve deeper levels of processing (i.e., comprehension and application) in a self-directed manner, which benefit students' performance (Senzaki, S., Hackathorn, J., Appleby, D. C., & Gurung, 2017, p. 1).

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