ASKING THE RIGHT QUESTIONS: USING STUDENT-WRITTEN EXAMS AS AN INNOVATIVE APPROACH TO LEARNING AND EVALUATION

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Most students are concerned about grades and often have negative attitudes toward testing. Students perceive traditional instructor-written exams as irrelevant and autocratic, leading to lower trust in teaching and evaluation methods and decreased motivation to learn. This paper discusses a new approach, the student-written exam, which is a take-home assessment where each student writes and answers his or her own exam questions. Guidelines for students include comprehensive learning objectives, instructions and examples for writing exam questions, format and submission criteria, and a grading rubric. Assessment results show that this method, while perceived as more challenging than traditional exams, improved the relevance of exam questions, increased student involvement with learning and self-evaluation, and helped students manage exam stress.

"What will be on the exam?" "How many questions will we get?" These are questions that instructors have to address every semester. As professors know all too well, students are concerned about grades and, much too often, an autocratic evaluation process using instructor-written exams leads to lower student trust in teaching and evaluation methods and decreased motivation to learn (Maddox 1993). Shortcomings of traditional exams mentioned in the literature include the overuse of poorly worded, ambiguous or irrelevant questions from published test banks that accompany textbooks; the possibility of cheating due to repeat use of the same test banks; the lack of immediate and specific feedback on final exams as only implicit performance is available based on overall exam grade; and not being experientially oriented (Green 1997; Maddox 1993; Razzouk and Masters 1989). These problems may lead to a deterioration of the professor–student relationship, lower student class involvement, a tendency to postpone studying until the last minute, increased exam-related stress, and an inclination to blame the instructor for poor performance on an exam (Maddox 1993; McIntyre and Munson 2008).

As an alternative to traditional exams, several researchers (Ahn and Class 2011; Green 1997; Maddox 1993) have proposed a first step in which students have input in their own assessment by generating their own questions and

submitting them to the instructor. The professor still has most of the control over selecting and editing questions to prepare a traditional exam. Some advantages of this approach are (1) student-generated questions create a test bank that is used by the professor to prepare traditional exams, (2) students become good question writers, and (3) it is an incremental approach to studying because students write exam questions on each topic covered in the course. Some limitations of this method are (1) student-generated questions focus on multiple-choice questions, (2) the professor has the administrative task of compiling student-generated questions into a test bank database, (3) there was no class discussion of exam questions (for an exception, see Ahn and Class 2011) or an opportunity for students to review or edit questions and responses before submission, and (4) student-generated questions required rating, editing, and supplementing from the professor to ensure that all of the course learning objectives were included in the exam.

In an effort to deal with these traditional examination and student-generated questions shortcomings, we developed and tested an innovative methodology that relies on students writing complete exams that include questions (multiple choice and short essay) and responses. The goals of this approach were to (1) improve the quality and relevance of the exam questions by tying them to course learning objectives, cases, and homework; (2) provide timely feedback on the exam and allow students to edit and correct their exams before handing them in; (3) increase student involvement with learning and self-evaluation; (4) minimize potential cheating; (5) help students manage exam

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stress; and (6) create a meaningful learning and evaluation experience for students.

Student-written exams require students to develop their own exam questions and complete answers. The instructor's involvement in the exam design is limited to specifying the content to be covered, the chapter learning objectives, the required number/format of questions, the cognitive level of the questions, and the exam submission deadline. There is no administrative work of creating, editing, or posting the test bank for the professor. The method was developed and evaluated in three undergraduate courses (marketing principles, retail marketing, and brand strategy) as an alternative to traditional exams and as an enhancement to the student-generated test bank method.

THE INNOVATION

Project Handout

The Student-Written Exam method is an open book and notes take-home exam in which each student writes and answers his or her own multiple-choice and short essay questions. The exam comprehensively covers course learning objectives found in textbook chapters, lectures, class exercises, cases, videos, homework, and team presentations.

We developed a detailed set of *exam guidelines*[1] to help students understand this new approach and the grading requirements. The exam guidelines include (1) a list of each chapter's learning objectives to keep students organized, reviews all material covered, and focuses on the relevant course content to be included in the exam; (2) instructions and examples of how to write good multiple-choice and short answer exam questions; (3) the exam formatting and submission criteria; (4) details and schedule of the exam feedback session; and (5) the exam grading rubric. The professor discussed the exam guidelines with the students about two weeks prior to the exam. Because of the method's novelty, the professor offered to review one multiple-choice and one short essay question from each student before the exam due date.

Even though students take numerous exams and quizzes in their educational careers, they do not have experience with writing either multiple-choice or short essay test questions. Therefore, detailed instructions were developed to help students write test questions (Green 1997). Directions for composing multiple-choice questions include recommendations for preparing questions on significant topics, incorporating only one correct response and three plausible, but incorrect, distractors. Instructions for the

short essay questions suggest phrases to begin questions, such as compare and contrast, explain, weigh the pros and cons, and so forth, to achieve different levels of challenge. Guidelines also describe how to write complete responses that demonstrate comprehension, application, and integration of the topics learned in the course.

Bloom's (1956) hierarchal six-level taxonomy was introduced to help the students prepare challenging questions. The students were asked to focus their questions on the first four cognitive levels—knowledge, comprehension, application, and analysis—of this classification system. The handout provides a definition of each of these four levels, suggested wording to begin questions, and example exam questions.

Exam Feedback Session

An exam feedback session of 1 hour and 20 minutes was held on the exam due date. Each student brought to class his or her individual student-written exam as well as a separate sheet of paper with one example of a short essay question and response. The first hour of the feedback session was allocated to asking and discussing the students' short essay questions. Then, students were given 10 minutes to individually review and make corrections on their own exam questions and answers before handing the exam in to the professor. Lastly, students completed a brief survey on the experience of writing their own exam.

Exam Grading

The grading rubric is included in the exam guidelines to let students know how they will be evaluated on the student-written exam. Questions were gauged based on how well they covered chapter learning objectives, utilized the four levels of Bloom's taxonomy, and challenged college students. Answers were measured based on writing, grammar, and how well an accurate and complete response was provided.

CONTRIBUTIONS

The student-written exam method is an innovative approach because of the following benefits for students and instructors:

1. Students take responsibility for their own learning and evaluation by writing their own exam questions and providing correct answers.

Figure 1
Retail Marketing Student Perceptions of the Student-Written Exam
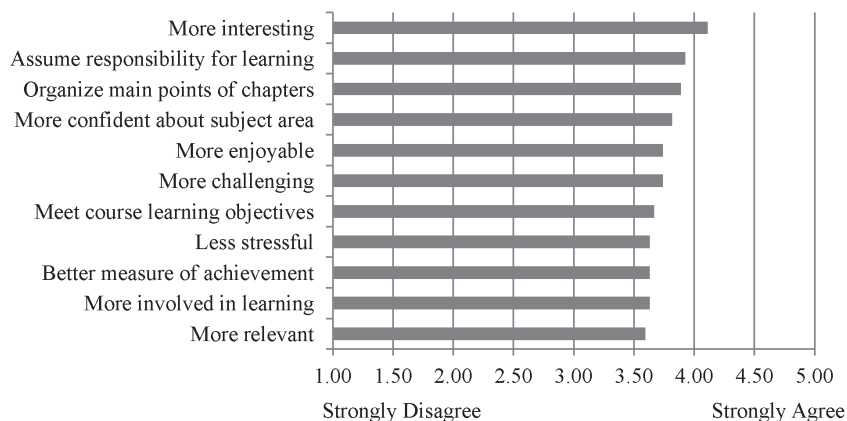
2. Compared to traditional exams where all students answer the same standard questions, this new method elevates the standards of writing exam questions and answers (see note 1) and allows students to be more creative about problem formulation and solution development.
3. Writing questions and responses combines action and reflection, providing students with a challenging and valuable learning experience.
4. Students receive immediate constructive criticism on the exam during the feedback session.
5. Students experience less exam-related stress than with traditional exams.
6. Students experience the exam from the instructor's perspective. This "role reversal" may strengthen students trust in teaching and evaluation methods and improve the teacher–student relationship.
7. Cheating is minimized because students write original exam questions.

PROJECT FEEDBACK

A survey given at the end of the exam feedback session asked the students to compare the experience of writing their own exam versus taking an instructor-written exam, on five-point Likert scales anchored by 1 = "strongly disagree" and 5 = "strongly agree." Figure 1 summarizes the results of this survey from the retail marketing class. All the item averages are significantly higher than 3 ($p < 0.01$). These results show that the student-written exam was effective in improving the quality and relevance of exam questions, increasing student involvement with learning and self-evaluation, helping students manage exam stress, and creating a meaningful learning and evaluation experience.

The survey also asked the students to evaluate the help received from the exam guidelines. Students' average ratings of the support received from the chapter learning objectives, the question writing instructions, the grading rubric, and the exam feedback session ranged between 4.0 and 4.7 on a five-point Likert scale anchored by 1 = "strongly disagree" and 5 = "strongly agree."

The students were also asked to indicate the benefits that they experienced from writing their own exam. Table 1 provides a summary of direct quotations that reflect the feelings expressed by some of the students in the three undergraduate courses. These comments fall into four main categories that meet this method's goals: in-depth learning, higher involvement, greater responsibility, and less stress.

CHALLENGES AND LIMITATIONS

This new exam format does raise a few challenges for both students and faculty. First, students may need to be taught to write exam questions. A solution to this challenge is to include examples of strong and weak multiple-choice and short essay questions in the exam guidelines and provide homework or class exercises for students to practice writing exam questions.

Second, based on where students lost points in the past (e.g., more than one correct response, awkward wording, and incomplete responses), there is an opportunity to improve the exam grading rubric to highlight and prevent errors seen in the first trials of this method.

Table 1
Student Quotations About the Student-Written Exam Method

Goal	Student Quotations
In-depth learning	I learned much more by writing my own exam since I had to include specific topics of every chapter and narrow down the information to what I could actually include.
	I was able to create and articulate some of the knowledge gathered this semester. I could go more in-depth about the topics that I took interest in.
	It helped me review and learn the main points of the chapters. It was also fun!
	This type of format made me explore the text in more depth than I would if I was studying for an exam.
Higher involvement	It allowed you to have creative control and play to your strengths.
	I was able to understand the material better because in order to ask a question, I needed to know what I was asking.
Greater responsibility	Interesting and novel way of studying. Forced me to think as a teacher instead of as a student.
	It forced me to take more action and initiative while studying. Thinking of questions was a different way of learning.
	Made me responsible for learning.
Less stress	Especially during finals, having this type of test was way less stressful, but we learned the material effectively.

Third, instructors may be concerned that this approach will increase grading time. Grading time was actually similar to that required by professor-written exams. Our experience with this method also showed that it was less tedious to grade different questions than to read and grade the same answers multiple times.

Fourth, instructors need to ensure that questions are challenging and applied based on the level of the course. Some examples of rigorous questions (written by the professor) are included in the exam guidelines (see note 1) to set the standard for writing exam questions and responses.

Fifth, although this method works well in small undergraduate classes (25–35 students), it may be too time consuming if implemented in larger classes (50+ students) where it would be difficult for the instructor to grade such a large number of original individual exams.

Instructors who implement this method have to be comfortable with losing some of the control on the quality and difficulty of the exam questions and the topics covered by these questions. Although the exam guidelines specify the standards for grading and the topics to be addressed, there will be variability in the topics covered by students' questions and responses. Nevertheless, the trade-off is a substantial gain in student motivation. It is also informative to the instructor to see the questions/problems that students find important and interesting.

One limitation in testing our method is the lack of control measures. To determine the effectiveness of this exam format, students should be assigned to treatment and control groups if instructors are teaching several sections of the same course. Sections assigned to the control group would take a traditional exam, and sections assigned to the treatment group would use the student-written exam method. Test results could then be compared for effectiveness based on previously established criteria.

OTHER APPLICATIONS

Students' comments and assessment of the student-written exams demonstrated that this method led to greater satisfaction with the exam experience and an appreciation for the higher level of involvement with their own learning and evaluation. The student-written exam is a teaching and evaluation tool that gives students experience with the method to independently develop questions and find solutions that will facilitate their academic and business careers. This method is a flexible approach to exams that can be used for midterms as well as finals. It can also be easily adapted in other courses, at both the undergraduate and graduate level, by following the format provided in the exam guidelines and changing the Chapter Learning Objectives to match the course content (see note 1). If this method is used for graduate courses, it is recommend that the cognitive-level requirements of the exam questions be raised to include evaluation and synthesis questions (Bloom 1956).

Online courses may also use this assessment method as an alternative to more expensive in-person or computer-proctored online exams. In fact, acknowledging the difficulty of implementing specific safeguards against cheating during online exams, researchers recommend the use of open-book exams or alternative assignments to replace traditional exams in online courses (Eastman and Swift 2001; Smith 2001).

NOTE

1. The exam guidelines and grading rubrics for the retail marketing course are available for download at https://docs.google.com/document/d/1_trsV8LL_ypA5xkxMbXJ-iLZWZpkvPz21zzGIZw1jcU/edit/.

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