

The Impact of Online Quizzes on Student Engagement and Learning

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Introduction

PSYCH 270: Introduction to Abnormal Psychology is typically a large lecture class that satisfies specific course requirements for Psychology majors and serves as a general education course. Because the knowledge base in Psychology doubles approximately every ten years, it can become quite a challenge to present such a large amount of material on psychopathology within one semester. The objective for this Teaching, Learning, and Innovation (TLI) grant was to increase student engagement with the course material, increase student learning, increase accountability for completion of assigned readings outside of class, and increase the amount of in-class time available for discussion and small group activities in comparison to the typical lecture format.

Pedagogical research findings within the field of psychology suggest that online, outside of class quizzes for assigned readings provide students with a variety of positive learning outcomes. For example, the use of online quizzes has been shown to motivate students to complete assigned readings, increase participation in class discussion, and improve performance on exams for material covered both on the quizzes and in class (Brothen & Warmback, 2004; Johnson & Kiviniemi, 2009). Consistent with these pedagogical research findings, 25 online ANGEL quizzes for assigned course readings were designed and implemented in two sections of PSYCH 270: Introduction to Abnormal Psychology in the fall semester of 2011.

It was hypothesized that, per the college's current strategic plan, the use of online quizzes would allow the instructor to engage students in more active learning, group projects, and class discussion. It also was expected that the online quizzes, coupled with immediate feedback regarding the percentage of correct answers given, would be viewed positively by students as an effective means of learning the course material. Although no statistical information can be gathered regarding significant differences in exam scores (there was no control group or section that had in-class versus online quizzes), students were expected to report that the online quizzes helped them study and gain mastery of the course material throughout the semester rather than simply cramming before a comprehensive exam in order to improve their performance.

Project Design

The instructor generated a multiple choice, online quiz for each of the 12 assigned chapters in the required textbook. The instructor also created a multiple choice, online quiz for each of the 13 additional research articles, case studies, and book chapters assigned in the course. Each quiz had an average of six multiple choice questions with four possible answers each (a-d). The TLI team assisted the instructor in placing the online quizzes onto ANGEL, selecting appropriate settings to allow for automatic grading, and in creating a link to the ANGEL gradebook. To promote mastery of the material, students were allowed to take each quiz as many times as they wished (with fifty minutes allotted for each attempt), with the highest grade obtained on any

attempt being recorded in the gradebook. In essence, students could retake each quiz as often as they liked until they mastered the material and earned the grade they wishes to receive.

The TLI team also helped the instructor present all quiz items in randomized order, along with a randomized test bank of answers. Settings on ANGEL also prohibited students from printing material on the screen, thus preventing them from easily printing out the quiz questions. This procedure was used to deter students from cheating by making it difficult to copy and share quiz questions and answers. The quizzes were closed to students one week before the mid-term and final exams. However, during the week before each of these two comprehensive exams, the settings on ANGEL allowed students to review each quiz's series of questions and answers.

To assess students' perceptions of the online quizzes, approximately one week before the end of the semester and through finals week, students were encouraged to complete a series of three open-ended essay and 11 Likert scale and multiple choice items regarding their use of the online quizzes. The TLI team helped generate these assessment items, and helped prepare an online format in ANGEL for its administration. Students' responses to the questionnaire were confidential, and the instructor did not review the student responses until final grades were submitted for the course. The instructor reviewed her notes throughout the semester to assess her perceptions of the online quizzes upon her course delivery and the quality of class discussions.

Learning Outcomes

Fifty two out of a possible 61 students completed the assessment questionnaire. Students' responses to nine of the Likert scale and multiple choice items are presented in Table 1.

Table 1: Students' Quantitative Responses to the Online Quizzes

Question	Likert Score*	
	Mean	S.D.
1. How helpful do you think the online quizzes were...to your learning of material in the course?	4.4	.72
2. How helpful were the online quizzes in preparing for class?	4.2	.56
3. If you used the online quizzes to study for exams, how helpful were they?	4.7	.72
4. How helpful was the ability to take the quizzes as many times as you wanted?	4.8	.48
5. How helpful was it to be able to review the questions...after each time you took the quiz?	4.8	.50
	Multiple choice responses Percent	
6. [What] best describes your method of taking the quizzes?		
a. I read the [reading] first and then took the quiz.		48
b. I started the quiz, and then referenced the reading as I answered the questions.		50

c. I took the quiz without reading the chapter or article at all.	2
7. Having to take the online quizzes made [me]...	
a. more likely to do the readings	80
b. less likely to do the readings	0
c. they had no effect	20
8. What effect [did] taking the online quizzes have on your attendance?	
a. more likely to attend	21
b. less likely to attend	2
c. no effect on class attendance	77
9. Do you think online quizzes should be included in other courses?	
a. yes	46
b. it depends on the course	48
c. no	2
d. neutral	4

Note: Due to the small sample size, it was not possible to conduct meaningful statistical analyses of potentially significant differences between students' responses to the multiple choice items.

*Likert scale responses ranged from 1 = not helpful to 5 = very helpful

Qualitative responses from 60 students to the following essay items (i.e., Please explain why the quizzes were helpful or not; Do you recommend any other learning tools in this course; Do you have any additional comments regarding the online quizzes) were also reviewed by Tricia Clark and the instructor to look for underlying patterns and themes. A number of beneficial outcomes were reported with use of the online quizzes, as well as some potentially negative outcomes and concerns. The following themes were identified and are presented in Table 2.

Table 2: Qualitative Themes from Analysis of Student Essays

Themes	Sample Statements
Positive	
1. Active engagement in course material	The quizzes made me pay more attention to the readings. They forced me to go back and reread certain parts of the chapters
2. Increase in learning and comprehension versus memorization	[They] really helped with learning the material instead of just memorizing it. They prompted me to be active in learning the material. I couldn't just goggle the questions...I had to dig in...my notes and/or the textbook to find the correct answer.
3. Increased recall	After taking the quiz a few times, the information really stuck with me
3. Better grades	I appreciated being able to take the quizzes over again...to boost my grade

4. Exam preparation	They helped me to review the material and test myself on what I learned. I knew what to expect on the exams
5. Class preparation	After taking [the quizzes] I was ready for class
6. Stress reduction	It helps to have a second chance. I didn't feel rushed [or] pressured

Negative

1. Concerns about minor details	Some of the questions were about very minor details in the reading
2. Computer and software challenges	Sometimes the quizzes were "down" but then worked shortly. Using a Mac computer sometimes made accessing these quizzes difficult.

Three students also made recommendations in which online activities and field trips be included in the course. One student suggested that the number of quiz attempts be limited in order to prevent students from simply guessing the answers.

Subjective responses from the instructor suggest that with the use of the online quizzes, significantly more class time was available for active learning activities such as role plays, debates, in class writing, and other small group activities. Although there was no control group for comparison, the instructor believed that student engagement significantly increased, particularly regarding discussion of the assigned readings. It appeared that more students participated, and offered more specific comments and informed opinions, than in previous class sections that did not offer online quizzes. It also is likely that this reported increase in class engagement generated increased enthusiasm in the instructor and positivity in the overall class dynamic itself.

Discussion

Virtually all students in this 200 level course applauded the use of the online quizzes for assigned textbook and outside readings. Students felt positively about the opportunity to become more engaged with the course material, to be better prepared for class, to be better prepared for exams, to earn better grades, and to learn and comprehend the course material versus simply memorize it. It also is notable that this positivity does not appear to be the result of a simple halo effect. Nearly half of the students indicated that online quizzes may be useful in other courses, but that their use would "depend upon" the course itself. In other words, students did not believe that online quizzes would be useful in every single course. Indeed, their use may be more beneficial in large classes or those in which a large amount of course reading is assigned.

Once an instructor has created and uploaded online quizzes associated with assigned course readings, these quiz materials can easily be used again. The online quizzes and assigned readings also can be updated or changed when appropriate, with only a limited investment of time and resources. The ability to have students actually come prepared to class to discuss an assigned reading, to engage more fully in class activities, to be better prepared for both class and

exams, and to have more time to engage in active learning activities, appears well worth the initial investment of time required to set up the online quizzes and the related ANGEL settings. Once the instructor becomes familiar with the ANGEL online quiz settings and online gradebook, it also becomes relatively straightforward to replicate these findings in other courses.

Recommendations

The use of online quizzes is highly recommended for any instructor teaching a course that is either large in size (with a typical lecture format) or that requires that students to engage in a significant amount of assigned readings. Students appear to benefit from the use of such online quizzes as they become actively engaged in the course material and study with greater frequency throughout the semester. Additional, specific recommendations for the use of online quizzes can be made including:

- Computerized settings can be designed to provide students with immediate feedback regarding their quiz grades, and allow them to take each quiz more than once to provide greater mastery of the material. It may be helpful to limit the number of quiz attempts to three.
- Placing time limits on the online quizzes (e.g., 60 minutes) encourages students to read the material ahead of time and then take the online quiz.
- Automatic, computerized grading and entry of each student's highest quiz grades into the course gradebook will generate significant time savings for the instructor, and provide students with immediate feedback on their quiz performance.
- To deter student cheating, the order of quiz questions as well as their multiple choice answers should be randomized. Settings also should not allow students to print the quiz questions or answers directly from the screen.
- To encourage students to engage in long-term learning, include some of the individual online quiz questions on midterm and final exams.
- Students can be allowed to review the quizzes and their answers a week before any comprehensive exams to promote better exam preparation.

Conclusion

The use of online, out of class quizzes allowed the instructor to have significantly more time for in-class active learning activities (e.g., debates, role plays, small group activities), and generated more lively and in-depth class discussions because students typically read the material before class in order to perform well on the online quiz. Students were very positive about the online quizzes in terms of ease of use, ability to learn course material in a timely, measured fashion, preparation for both class and comprehensive exams, and to improve their course grade, as well.

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