

Cite as: DePaolo, C. A., & Wilkinson, K. (2014). Recurrent Online Quizzes: Ubiquitous Tools for Promoting Student Presence, Participation and Performance. . *Interdisciplinary Journal of E-Learning and Learning Objects*, 10, 75-91. Retrieved from <http://www.ijello.org/Volume10/IJELLOv10p075-091DePaolo0900.pdf>

Recurrent Online Quizzes: Ubiquitous Tools for Promoting Student Presence, Participation and Performance

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Abstract

We present the idea of recurrent, in-class online quizzes as an effective and efficient way to promote student attendance (presence), engagement (participation) and to provide formative assessment (to enhance performance) within a face-to-face course. Quizzes during each class meeting encourage students to attend class regularly and participate actively. In addition, automated feedback helps students identify strengths and weaknesses and allows instructors to immediately address common mistakes and gaps in learning. In this exploratory study, the perceptions of students toward these recurrent quizzes are investigated. Results show that students feel the quizzes motivate them to attend class and participate actively. Students also reported that the quizzes helped contribute to their performance in the course by providing immediate feedback on progress and helping them identify important course concepts. All of these objectives can be achieved with minimal workload for the instructor and can easily be adapted for blended or distance courses.

Keywords: Online assessment, quizzes, participation, attendance, performance, workload

Introduction

In 2014, the majority of undergraduate students are Millennials for whom technology is pervasive in their lives. According to enrollment figures from the National Center for Education Statistics (NCES), more than 78% of undergraduate students were under 30 years of age in 2011 (National Center for Education Statistics, 2012). These students, classified as Generation Y or Millennials, have been called “digital natives” (Prensky, 2001) and have been said to be “defined by their technology use” (Krigman, 2010). Besides this influx of technology-savvy students, in some settings, higher education is shifting focus from pedagogy to andragogy and the recognition that

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needs and expectations of adult learners are changing (Werth & Werth, 2011). More effort is being devoted to student engagement and assessment, and outcome-based, student-centered, problem-based and active learning environments that leverage multiple media for learning and assessment are increasingly emphasized (Stasio, 2013). At the same time, in many settings, class sizes are increasing due to budget constraints (Oliff,

Palacios, Johnson, & Leachman, 2013), which puts more burden on faculty to implement meaningful learning activities while keeping workload in check.

Despite these evolving aspects of higher education, the principles of effective undergraduate education as proposed by Chickering and Gamson (1987) are still relevant; as evidenced by a 2014 search of Google scholar, there is no shortage of scholarly articles that have recently cited or referenced these seven principles that were proposed almost 30 years ago. These principles assert positive and successful learning environments should provide students with opportunities for active learning and prompt feedback while promoting contact between students and faculty and communication of high expectations, among other qualities.

One of Chickering & Gamson's (1987) principles, prompt feedback, is central to the relationship between students and learning. Assessment (feedback) in the classroom is changing from just a grade generator to a meaningful tool for learning and evaluation (Dochy & McDowell, 1997). There are many different types of assessments an instructor can use in the classroom to both engage the learner and evaluate learning and retention. There are differing levels of interaction with the instructor and the material that should be recognized. First, a student must be present in the course to be assessed and to receive constructive immediate feedback. Next, a student must participate in the activity or assessment, and may receive, as a result, "clues" regarding the importance of content or concepts. Finally, a student's performance on an assessment activity can help demonstrate – to both the student and the instructor – if and to what extent the student is learning the content, and may identify gaps in learning to target for further study.

We propose a simple process that accomplishes multiple objectives for both students and faculty. Recurrent online quizzes during class time use technology to promote student attendance (presence), encourage student engagement with the content (participation), and also provide immediate, detailed feedback to students on their learning progress (performance). At the same time, these quizzes can be used by faculty to record attendance, measure learning, and quickly identify gaps in learning, even in large classes. All of this is done seamlessly using the university's learning management system (LMS) to facilitate the process and is consistent with a student-centered learning environment while not imposing undue burdens on instructors or students.

The purpose of this exploratory study is to begin to evaluate student perceptions of these recurrent quizzes and to promote this process as an efficient and effective way to accomplish multiple goals. We also provide guidance to other instructors wishing to implement this process.

Review of Literature

In the following paragraphs, we review the literature with regard to characteristics of current students and how presence, participation and performance relate to student learning. We then position recurrent quizzes as an assessment tool that accomplishes all three of these goals while providing benefits to the instructor. Research studies related to daily online quizzes are also reviewed.

Current Students: Digital Natives

Students in the college classroom today are expected to be "connected" in a variety of ways. As students engage with the technology, it is our responsibility to measure the effectiveness of their learning within the context of the technology (Bennett & Maton, 2010). Technology is more than just a tool for performing an educational task; students have assimilated technology into the very fabric of their learning, particularly in higher education.

Digital natives now learn in a more "adult-like" way. *Andragogy*, the theory of teaching adults described by Malcolm Knowles (1980) has four simple postulates:

1. Involvement in the planning and evaluation of their instruction,
2. Experience will provide the basis for learning activities,
3. Learning must have immediate relevance to career or personal life, and
4. Learning is problem-centered, (Open Education, n.d.)

Conners (as cited by Open Education, n.d.), building on Knowles theories, stated learners must know why something is important to learn. Consistent with these principles of andragogy, online quizzes alert students to important information and connect knowledge to real world problems.

Presence (Attendance)

Attendance has always been deemed as one of the most important aspects of taking a class. Not surprising is the empirical evidence indicating an inverse relationship between absenteeism and learning (Durdan & Ellis, 1995; Marburger, 2001; Park & Kerr 1990). Marburger (2006) found students who were continually absent during a class period were 9 to 14 percent more likely to incorrectly answer question(s) pertaining to material covered the student's absence. Massingham and Herrington (2006) suggested students who attend class tend to be more in control of their learning/study habits. It should be noted that this study also found these students who attended classes also took advantage of other resources provided by the instructor. These students participated in a variety of activities focused on the learning outcomes of the course.

In addition to attendance being deemed a key to success in the classroom, there are also reasons for the instructor to record attendance for financial aid purposes and to monitor "satisfactory academic progress (SAP)" of students toward degrees. To prevent financial aid fraud, some institutions, particularly community colleges and/or those with large distance education programs, now require faculty to record student class attendance (or participation in class activities in distance courses) (Baim & Mullin, 2012; Indiana State University, n.d.). The challenge for faculty who are required to report attendance is to develop a system that is accurate but uses minimal class time and administrative energy.

Some approaches to taking attendance in face-to-face classes include seating charts or calling out names in class. These approaches can be time consuming to faculty, or even completely infeasible for courses with large enrollment. Another approach that is less onerous to the faculty, distributing an attendance sheet around the classroom, is subject to falsification by students "signing in" their friends who are in fact not present. In addition, these approaches are largely instructor-centered, simply performing a task that needs to be accomplished each day.

Milne et al. (2007) found that with electronic delivery (automatic submission, management, and "grading") of quizzes during each class period, technology provides "administrative benefits and time and resource saving" (as cited by Henrich, Milne, & Granshaw, 2012, p. 280), allowing faculty to track attendance quickly and accurately while keeping workload in check. Alexander, Bartlett, Truell, and Ousenga (2001) found instructors in face-to-face courses are turning to online testing because of its convenience in scheduling, time saved on grading, and reduced costs of delivery. In addition, if points are assigned to each quiz, this mechanism may encourage students to attend class more regularly, thus obtaining the benefits of class attendance.

Participation (Engagement)

Knowles' Adult Learning Theory ("andragogy") focuses on the faculty member as a facilitator and the classroom as a student-centered, active learning environment (Knowles, 1980). This concept is a great fit for digital natives (Werth & Werth, 2011). Knowles also believed that the adult learner should self-evaluate and utilize that self-evaluation in practical application of class material (Knowles, 1980).

How class participation is handled within the course environment drives the expectations of participation itself. Many faculty feel that participation in a classroom is a sign of active learning (Czekanski & Wolf, 2013). One study revealed a small relationship between self-reported GPA and self-reported student classroom participation (Scepansky & Bjornsen, 2003). However, using classroom participation as an assessment tool is a “double-edged sword.” It can cause excessive work for the instructor and feelings of coerciveness by the student (Armstrong & Boud, 1983). Although there are negative aspects of participation as assessment, other studies that support this type of assessment showed students were better prepared and had a greater mastery of the materials (Armstrong & Boud, 1983; Beekes, 2006; Dunaway, 2005).

The short quiz is a tool that can provide an incentive for both attendance and engagement (Nevid & Mahon 2009). However, both students and faculty do not want to be “bothered” by quizzes if they are solely viewed as “busy work.” Students in today’s higher education classroom want to know the quizzes they are taking are more than just attendance takers; they want to see a concrete purpose that is directly applicable to their learning of the content (Werth & Werth, 2011).

Nevid and Mahon (2009) found using mastery quizzes frequently provided incentive for students to be attentive and participate in classroom activities, as the activities provided cues for important information that was found on the mastery quizzes. Nevid and Mahon stated anecdotally that students actually liked the master quizzes embedded in the classroom process. Similarly, an electronic quiz used every class period and covering concepts from that class period may increase engagement by requiring students to do something other than listen while in class and to pay attention and focus on course content in order to do well on the quiz. These quizzes may also aid in self-evaluation of learning, as adult learning theory suggests (Knowles, 1980).

Assessment & Learning (Performance)

With the challenge of quantifying classroom participation for assessment purposes, faculty look for systematic ways of assessing learning within the classroom environment. These types of classroom-based systems as supported by Pellegrino, Chudowsky, and Glaser (as cited by Rakoczy, Klieme, Burgermeister, & Harks, 2008) “...should interact with existing practices and routines of student evaluation in the classroom”.

The use of quizzes as part of a classroom based assessment system can be beneficial for both the student and the faculty member. Research shows students who were tested over material and successfully recalled it remembered it better than if they were given and told to remember the material without being tested over it. This phenomenon is called the “testing effect”. Roediger and Karpicke (2006) research supported the testing effect by finding that repeated testing produced positive effects on the retention of knowledge. Roediger and Karpicke also reported the use of frequent quizzes led students to better pacing of studying.

In “Seven Principles of Good Practice in Undergraduate Education,” Chickering and Gamson (1987) posited the framework for effective student learning strategies. Although all of these practices are relevant to this study, the notion of “giving prompt feedback” provides the impetus for using the recurrent quizzes. As students take the quizzes, they are provided “*immediate feedback*” regarding the results. Students are able to identify instantly the areas they may need to remediate or are given positive reinforcement when they answer correctly. They are able to discuss any problems or errors with the instructor right away when the concepts and discussions are fresh. However, students may not immediately recognize the need to do this on their own or right away. Zinn et al. (2011) recommend that faculty may need to have frank discussions with students about how to use the feedback to direct their study efforts.

Additionally, the immediate results of the assessment allow the faculty member to quickly identify problem areas for the class as a whole and adjust instruction to revisit topics that the class did

not appear to master. Thus, these recurrent quizzes may facilitate a two-pronged approach (self- and external assessment) to help students learn material more effectively.

Use of Quizzes

There exist few studies addressing frequent quizzes and fewer regarding online frequent quizzes. Leeming (2002) found giving an “exam a day” procedure produced better final grades in the course and students felt they studied more for the course. Objections to this paper and pencil essay question exam method included that testing took away from teaching and that manual grading of exams was burdensome.

Granger and McGarry (2002) looked at the use of online testing in two face-to-face courses, one of which utilized online course testing for weekly quizzes and the other for the mid-term and final exams. Immediate feedback was not part of the software at this time. The authors felt the online testing format might be an obstacle for both the instructor and students. Results of the study indicated there was no difference in the scores of the traditional testing and the online testing. Workload was a concern of the authors, however, as the significant technology failure rate prompted instructors to create a paper and pen exam also.

With the assumption that student test-taking anxiety would be reduced with online testing compared to a paper and pen format, Stowell and Bennett (2010) found there was no difference in test taking anxiety between the two testing environments. Although they let students take the exams within a certain timeframe on their own schedule, students found taking “high stakes” exams anxiety-inducing no matter the environment, and in fact, the fear of technology failure heightened the anxiety in the online environment.

Pennebaker, Gosling, and Ferrell (2013) found in large enrollment courses, 10 minute daily quizzes using technology were effective in improving student scores by improving their self-regulated learning. The researchers’ results indicated repeated testing and feedback improved both short-term and long-term performance improvements.

Purpose of the Study

It is hypothesized that quizzes given every class period will improve student presence, participation and performance in a course. However, an experimental design to test such hypotheses is difficult. To begin an exploration of the effectiveness of these recurrent quizzes, we look to gather indirect information based on student opinions of how the quizzes affected them individually in each of these areas. While instructors value student presence, participation, and performance, it is also important to know if students perceive that regular quizzes can contribute to learning by encouraging attendance and participation, and by providing formative feedback that leads to better and more efficient learning and performance in the course. If students do not recognize or appreciate the multiple purposes of the quizzes, they might be conceived as “busy work” or wasted time, and as a result, students might not realize the full benefits of the activity.

The purpose of this study is to determine student perceptions of how online quizzes during each class meeting in a face-to-face course affect their presence, participation, and performance in the course. We put forth the following hypotheses:

- H1: Students will perceive that quizzes increase their motivation to attend and be prepared for class.
- H2: Students will perceive that quizzes motivate them to participate actively in daily class activities.

H3: Students will perceive that quizzes contribute to their learning by helping them focus on important course concepts and providing them formative feedback on progress toward course learning goals.

Furthermore, in the spirit of the exploratory nature of this study, we also wished to address the following general research question:

R1: What were the attitudes (likes or dislikes) of students regarding the use of daily quizzes?

Methods

Participants

The quizzes were used within multiple sections of two face-to-face introductory undergraduate statistics courses that are required for all business majors within the College of Business at a mid-sized, Midwestern public university. These courses usually have enrollment of 45-55 students per section. Students are typically sophomore or junior business majors, though some advanced freshmen may be enrolled and some seniors may be retaking the course. The participants were enrolled in six sections of the statistics I or II courses during the spring 2013, fall 2013, and spring 2014 semesters. All sections were taught by the same instructor.

The sections in which the quizzes were utilized are laptop (or tablet) intensive. The university has a mandatory laptop policy, so all students have devices they bring to class. The instructor regularly has students interacting with data, statistical software, and internet sources during class periods, so laptops are available every day for students to take online quizzes.

Format of Quizzes

The quizzes were administered through the course's LMS (Blackboard) during every class period and each took about 3-5 minutes. We have several reasons for using a LMS instead of other technologies such as clickers and in place of standard pencil and paper quizzes. First, students are familiar with the LMS from other class activities and assignments, and because we are a laptop institution, not only is this technology readily accessible, but there is, in fact, an expectation of technology usage in the classroom. Second, as instructors, we were searching for methods that did not increase our own workload. Trying a new technology or implementing any new process takes time and effort, and we felt using the LMS only slightly added to instructor workload. Lastly, the ability of the LMS to provide detailed, immediate feedback, possibly tailored to each student's mistakes, makes it superior to "old fashioned" paper quizzes.

Each quiz consisted of two questions. The first usually reviewed an idea or calculation discussed during that class period; for this problem, the instructor would talk through and select the correct answer with the class. All students who attended class would earn the points for this question, so these points were purely for presence. For the second question, an important concept from that class period was tested and students completed these questions independently. These points then were assigned based on participation (did they pay attention and engage with the material) and performance (can they answer correctly). Commonly, students were asked to choose which are the true statements regarding a concept. For example, some topics might include concepts about standard deviation or sampling error, interpretation of confidence intervals, conclusions regarding hypothesis tests, appropriate applications of statistical methods, or interpretation of statistical output in terms of a decision problem. The instructor often used questions that probed common misunderstandings or mistakes related to the day's topic. Infrequently, when students experienced computer problems they were allowed to complete the quiz on paper.

Quizzes were automatically graded when submitted and students were given instant feedback on the correctness of their answers, as well as detailed explanations or clarification if they made errors. Automated text feedback addressed common misinterpretations or confusions, pointed out nuances of meanings or statements, or provided more detailed descriptions of why answers were correct or not. Thus, students could identify any mistakes and immediately ask questions during class. The quizzes acted as a formative assessment tool that both informed individual students what they did and did not understand and also provided the instructor with feedback on where confusion and difficulties occurred for groups of students.

Twenty-six quizzes were given in a course that meets twice per week for fifteen weeks. The quizzes were administered starting in the second week of the semester and were not given during class periods with exams. Each quiz was worth a small number of points, typically 1.5 points out of a 500-point course. A total of 39 quiz points were possible if students attended every class period and answered every quiz question correctly; however, a maximum of 30 points were counted toward class participation grades. The point values were established so that students did not have to get all of the questions correct on all of the quizzes to earn the maximum number of course participation points. For example, someone who attended every class period would only need to earn $30/39 = 76\%$ of all of the possible points on the quizzes they took; however, someone who was absent five times would need to earn $30/31.5 = 95\%$ of their possible points to earn the full amount of participation credit. It was impossible for students who missed 7 or more classes to earn full participation credit, even if they earned 100% on all quizzes they took. It is important to note that students were made aware, and reminded, that the more classes they missed, the harder it would be to earn all participation points. On average, students earned approximately 79% of the points on the individual participation quizzes. Overall, about 75% of students earned the maximum of 30 participation points for the course.

Survey Instrument & Procedures

A brief survey was developed to investigate student perceptions of the participation quizzes. The questions asked students their agreement with several statements about how they perceived their presence, participation and performance in the class had been affected by the participation quizzes. They were also asked about their attitudes about the quizzes themselves. Most questions were answered on a 5-point Likert scale, but students were also allowed to write open-ended responses about what they liked and disliked about the quizzes. Students were asked to provide their age, gender, GPA and class rank. The survey instrument is shown in the Appendix. Appropriate clearance for collecting and using the resulting survey data was sought and obtained through the university's IRB.

With regard to presence, students were asked if they felt having the quizzes each day motivated them to attend class more often and to come to class prepared. The participation questions asked students about how the quizzes affected their motivation to pay attention, focus, and engage in class activities. Other questions explored student attitudes about their performance, for example, if the quizzes helped them identify important concepts and areas they needed to study more, and if they learned better because of the quizzes. The final set of perception questions asked students if the quizzes were fair or too pressure-inducing and if they liked them and thought other professors should use them.

The anonymous survey was implemented through Qualtrics during the last week of regular classes and during final exams. Students were given access to a link to the survey through Blackboard and were offered a small amount of extra credit in the course for participation. The survey could be completed outside of class at any time during the two week period and the instructor made no attempts to persuade students to complete the survey except to announce the opportunity. To ensure anonymity while still being able to provide extra credit, a completion code was

posted to the user’s window upon completion of the survey. That code was then provided to the instructor as evidence of completion for extra credit purposes without having any identifying information stored in the database with the survey responses. An informed consent statement, including a statement of anonymity, was provided at the beginning of the survey. The informed consent statement was approved by the university’s IRB.

Results

Of the 286 students who completed the six courses in which the quizzes were employed, 209 completed the survey, resulting in a 73% response rate. The sample consisted of 56% males and 44% females, which is similar to the population of business students who take this course (60% male vs. 40% female). The average age of respondents was 21, with 6% of the sample consisting of non-traditional students (over 25 years of age). Of the 212 students, 50% were sophomores and 37% were juniors, with freshmen and seniors comprising 3% and 9% of the sample, respectively, proportions that closely mirror the percentages of each class year in the population of students enrolled in these courses. Twenty-seven percent of the sample reported cumulative GPAs of 3.5 or higher (on a 4-point scale), while only 7% reported GPAs less than 2.5, which is consistent with minimum GPA requirements for the college. The remainder reported cumulative GPAs of 3.0-3.49 (41%) and 2.5-2.99 (25%).

In the following paragraphs, student opinions about how the participation quizzes affected their presence, participation and performance in the class are discussed. In addition, student perspectives about what they liked and disliked about the quizzes are summarized.

Presence

The first purpose of the participation quizzes was to increase student motivation to come to class and, furthermore, to be prepared with the tools they need (e.g., their laptops or tablets). This is the necessary first step to obtaining the full learning benefits of class activities and discussion. We hypothesized in H1 that students would perceive that quizzes increase their motivation to attend and be prepared for class. Table 1 summarizes the means and standard deviations of the four “presence” questions on the survey. Students agreed that the quizzes motivated them to come to class and to bring their laptops, with means for these and other “presence” questions at around 4 or higher, where 5 indicates “strongly agree”. Therefore, these findings support hypothesis H1.

Table 1: Effects Of Quizzes On Student Presence In Class

<i>How strongly do you agree with these statements?</i> <i>(5 = Strongly Agree, 1 = Strongly Disagree)</i>	Mean	St Dev
The participation quizzes gave me more motivation to attend class.	4.31	0.91
The participation quizzes motivated me to bring my laptop to class.	4.44	0.77
I skipped class less often because I didn’t want to miss participation points.	3.99	1.10
Having participations quizzes each day motivated me to be prepared for each class period.	3.98	0.95

Participation

The second purpose of the participation quizzes was to increase student participation in class activities. Participation goes beyond just being present; to get the maximum learning benefits from class instruction, students must engage in the class activities, pay attention, focus on content, work on problems, ask questions, etc. Hypothesis H2 stated that students would perceive that

quizzes motivated them to participate more actively in class activities. Table 2 summarizes student opinions about how the participation quizzes affected their participation in class. The findings suggest that the quizzes contributed to students' motivation to participate in class activities. For example, students agreed they were more inclined to pay attention, to participate, and to focus on class activities because of the quizzes, with means for each item above 4.11 on a 5-point scale, where 5 = strongly agree. Thus, these results support hypothesis H2.

Table 2: Effects Of Quizzes On Student Participation In Class

<i>How strongly do you agree with these statements?</i>		
<i>(5 = Strongly Agree, 1 = Strongly Disagree)</i>	Mean	St Dev
The participation quizzes motivated me to pay attention in class.	4.20	0.92
The participation quizzes helped me focus on content that was important to learn.	4.25	0.81
The participation quizzes motivated me to focus more on class activities.	4.26	0.83
I was more engaged in class activities because I wanted to do well on the participation quizzes.	4.11	0.87

Performance

The final purpose of the quizzes is to help students perform better in the class by helping to identify important course concepts, common misunderstandings, and individual student gaps or deficiencies. The quizzes provided low stakes, formative assessment feedback to students. While measuring actual performance in terms of grades is beyond the scope of this particular study, students were asked to report how they perceived the quizzes helped them in these areas. We hypothesized in H3 that students would “perceive quizzes contributed to their learning by helping them focus on important course concepts and providing them formative feedback on progress toward course learning goals.” Table 3 summarizes the results of the questions related to performance. Student responses suggest that they perceived that the quizzes helped them to identify and understand important course concepts, gave them immediate feedback on how well they understood and what they needed to further study, and helped them understand what knowledge was expected of them, with all means above 4.0 on a 5-point scale, where 5 represents strongly agree. Therefore, our findings also lend support to hypothesis H3.

Table 3: Effects Of Quizzes On Student Performance In Class

<i>How strongly do you agree with these statements?</i>		
<i>(5 = Strongly Agree, 1 = Strongly Disagree)</i>	Mean	St Dev
The participation quizzes helped me understand the concepts better.	4.15	0.89
The participation quizzes gave me immediate feedback on how well I understood class concepts.	4.27	0.82
The participation quizzes helped me identify what I needed to study more/learn better.	4.06	0.95
The participation quizzes helped me identify what the important concepts were.	4.29	0.77
The participation quizzes helped me understand what knowledge was expected of me.	4.27	0.77
I learned the concepts better because of my completion of participation quizzes.	4.02	0.92

Other Perceptions of Quizzes

In addition to the effect of the quizzes on presence, participation, and performance, the survey asked students about their perceptions of the quizzes, including their opinions about whether the quizzes were fair, how they felt when taking the quizzes, and what they liked and disliked about them. The purpose of these questions was to explore research question R1 concerning the attitudes (likes or dislikes) of students regarding the use of daily quizzes. Table 4 summarizes student responses to several opinion questions. The results suggest that students liked the quizzes, felt they were fair, and would like other instructors to use them. They also agreed that once established in the routine, they became accustomed to doing the quizzes in class. Students were largely neutral about the statement that the quizzes put too much pressure on them to get the right answer (see Table 4).

Table 4: Student Perceptions of Participation Quizzes

<i>How strongly do you agree with these statements? (5 = Strongly Agree, 1 = Strongly Disagree)</i>	Mean	St Dev
After a while, the quizzes just became another part of regular class activities.	4.25	0.82
I felt I knew what was expected of me when taking the participation quizzes.	4.20	0.84
I felt the participation quizzes were fair.	4.30	0.83
I felt the participation quizzes put too much pressure on me to get the right answers.	3.05	1.36
I liked the participation quizzes.	4.05	1.02
I would like it if other professors/instructors used participation quizzes.	3.94	1.06

What Students Liked About Quizzes

In addition to indicating agreement with these questions, students were also asked to provide written comments about what they liked and disliked about the quizzes. Of the 209 respondents, 180 (86%) provided written comments about what they liked about the class

A qualitative analysis of responses was also conducted. Out of the 180 written responses, over 48% of students said that what they liked most about the quizzes related to attendance or “presence”. Some representative student responses include:

- “They gave motivation to attend class and pay attention.”
- “They help those that paid attention get some points for actually going to class.”

Also in these written responses, approximately 19% of students commented what they liked most about the quizzes related to “participation.” For example, some students wrote:

- “Taking participation quizzes each class was expecting students to focus and pay attention during class, so that’s what made us pay attention more to get a good grade on the quiz.”
- “It is a fair way to get participation points, but you also have to pay attention and not just show up.”

Lastly, a large percentage of students (almost 44%) indicated what they liked most about the quizzes related to their “performance” – learning and understanding of course content. Several

students referred to the quizzes helping them to learn and think about the content, while others referred to the quizzes helping them identify what the most important concepts and ideas were. Other students found the immediate feedback most helpful. For example, some representative comments were:

- “I think a positive was the fact they made you use what you just learned into action to see if you actually understand the material.”
- “They reinforce important points. You immediately know if you understand the topic or not.”
- “They gave you a result right away, showing you if you understand the concepts being taught for the day. If I did poorly, I knew to ask questions while I still had the instructor in front of me.”
- “It allowed me to see that I understand the lesson and was correct. It wasn't too many points to where I would be upset if I got something wrong. It allowed me to learn from my mistakes.”

What Students Disliked About Quizzes

Of the 209 respondents, 168 (80%) provided written comments about what they disliked about the class. A qualitative analysis of the 168 written comments indicated 79 students (47%) said there was nothing they disliked about the quizzes.

A substantial portion of students (about 27%) commented what they liked least about the quizzes related to attendance or “presence” and how points were assigned. The most common complaints are represented by these comments:

- “The only thing that I didn't like about the quizzes was when you miss class there was no way to get those points back.”
- “Even if you show up to class you can still get the answer wrong and miss points even though you pay attention and try.”

Two students were concerned about the integrity of the process, one of which expressed this sentiment:

- “I think that the participation [quizzes] were bad in the sense that you could not come to class and just log into blackboard at the time class was and take the quiz. Even the questions that were class specific could be thwarted if you had your neighbor's phone number. They could just text you the answer.”

With respect to participation aspects of the quizzes, a fairly common sentiment, expressed by about 16% of students, was that the questions on the quizzes were too difficult or confusing. For example, one student expressed:

- “Sometimes the ones where you had to check all that apply or pick one were tough and I lost a good amount of points there.”

Lastly, five students raised the issue of fairness and pressure, for example, one student expressed:

- “Attendance to class shouldn't be graded on our knowledge of what we learned in class that day. Some people need to go home and study the material before they can do well on a quiz.”

Differences among Subgroups

Additional analyses were conducted on the quantitative questions to explore if there were any differences in responses between different student subgroups. Analyses indicated there were no

significant differences in responses to any of the survey questions among students with respect to age or gender. With respect to GPA levels, there was some weak evidence that those students with the lowest GPAs (under 2.5) were less likely to feel they knew what was expected of them on the quizzes and that the quizzes were fair; however, with a small sample size (13 out of 209 students), these differences were not found to be statistically significant at a 5% significance level. We surmise that, because students must maintain a certain GPA to stay enrolled in the College of Business, we will continue to have low numbers of these students; and furthermore, they may have more issues than just the quizzes in this course. However, this topic may be of interest to pursue further.

Conclusions and Implications

Based on student feedback, it appears as though the quizzes were successful in fulfilling their intended purposes to increase student presence, participation, and performance in these face-to-face classes without appearing to cause any major student backlash. Several benefits to both students and instructors of face-to-face courses can be realized by incorporating recurrent online quizzes. Both the students and the faculty found this tool effective for their needs. Faculty looking for a way to perform multiple tasks with minimal workload increase will find using the recurrent online quizzes “fits the bill” by seamlessly providing an accurate attendance record while encouraging engagement. The recurrent online quizzes provide a formative assessment tool and an accountability tool for students by way of automated grading feedback through a learning management system, immediately telling individual students where their personal learning gaps are while alerting faculty to common mistakes and allowing adjustment of instruction to meet student needs.

The instructor plans to continue to implement these quizzes in these and other face-to-face courses in the future, but continues to make improvements. In initial semesters, some of the quiz questions were not ideally crafted, which created some confusion among students. However, even with occasional poor questions, the overall perceptions of the quizzes were positive. In subsequent semesters, efforts have been and will continue to be made to design quizzes more carefully. Therefore, it is reasonable to assume that perceptions of quizzes should become more positive, rather than more negative, over time as the instructor has more opportunities to develop reliable question banks.

For other instructors wishing to implement similar quizzes in their courses, we would recommend resolving the following issues prior to implementation and discussing these topics with students:

- **Points (Course Credit):** How will points/credit be assigned, based on participation alone or correctness of answers, or some combination? What will be the policy about missing quizzes and points? Is it “fair” to your students to assign points over material they have not had time to study?
- **Practice (Delivery):** Will quizzes will be done on laptops only or will mobile devices such as tablets and phones be allowed? How you will deal with internet or technology problems that prevent students from participating?
- **Purpose (Design):** How do the quizzes fit as part of the instructional design of the course? What are the main and secondary purposes? It is recommended that quizzes be used to reinforce important concepts and common mistakes or misunderstandings. Instructors should also make sure students are clear that the purpose of the quizzes is to give them feedback, so that they can glean the maximum benefits from them.

Although these quizzes were implemented in a face-to-face course, they could easily be adapted for distance and hybrid course delivery methods. For example, in a true distance course, quizzes could be organized by topic or module rather than by class period. Students would still receive

benefits of “presence” by having required, regular interactions with the material, “participation” by requiring engagement with the material beyond simply reading a chapter, and “performance” by having immediate feedback on concepts or points they did not fully understand. Instructors still would have the benefit of having a user-friendly record of student activity for “attendance” tracking in distance courses and could still use results to adjust instruction or perform interventions when common areas of confusion arise.

Of course, these results are based on initial explorations of student perceptions in an observational study, rather than a designed experiment. We acknowledge that, based solely on these student-reported responses, we cannot determine whether the quizzes themselves drove attendance rather than the scoring system. We also did not seek formal evidence to show that the quizzes actually did improve student performance in the course. Though experimental designs are difficult to carry out in educational settings, investigating the real and measurable effects of recurrent online quizzes while attempting to control for other variables should be a topic of future research.

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Appendix

Survey Instrument

Section A. How strongly do you agree with each of the following statements regarding the Participation Quizzes given by your instructor each day?

5 = Strongly Agree;

4 = Agree;

3 = Neither Agree Nor Disagree;

2 = Disagree;

1 = Strongly Disagree

1. The participation quizzes gave me more motivation to attend class.
2. The participation quizzes motivated me to bring my laptop to class.
3. I skipped class less often because I didn't want to miss participation points.
4. Having participations quizzes each day motivated me to be prepared for each class period.

5. The participation quizzes motivated me to pay attention in class.
6. The participation quizzes helped me focus on content that was important to learn.
7. The participation quizzes motivated me to focus more on class activities.
8. I was more engaged in class activities because I wanted to do well on the participation quizzes.

9. The participation quizzes helped me understand the concepts better.
10. The participation quizzes gave me immediate feedback on how well I understood class concepts.
11. The participation quizzes helped me identify what I needed to study more/learn better.
12. The participation quizzes helped me identify what the important concepts were.
13. The participation quizzes helped me understand what knowledge was expected of me.
14. I learned the concepts better because of my completion of participation quizzes.

15. After a while, the quizzes just became another part of regular class activities.
16. I felt I knew what was expected of me when taking the participation quizzes.
17. I felt the participation quizzes were fair.
18. I felt the participation quizzes put too much pressure on me to get the right answers.
19. I liked the participation quizzes.
20. I would like it if other professors/instructors used participation quizzes.

Section B. Please provide your comments below.

21. *What did you like or think was positive about the participation quizzes?*

22. *What did you dislike or think was negative about the participation quizzes?*

Section C. Please tell us a little about yourself.

23. What is your current class rank?

- A. Freshman
- B. Sophomore
- C. Junior
- D. Senior

24. What is your current cumulative GPA (on a 4-point scale)?

- A. 3.5 – 4.0
- B. 3.0 – 3.49
- C. 2.5 – 2.99
- D. 2.0 – 2.49
- E. Under 2.0
- F. Prefer not to answer

25. How old are you?

26. What is your gender?

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