

Are Online Quizzes More Efficacious? An Exploratory Study on Classroom Practices and Student Perceptions

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Abstract

One of the most important factors contributing to high quality instruction is an efficient and effective assessment. This research study focused on student perspectives on the use of online quizzes in ground classes, and their follow-up test performance. Two online quiz creators were used: Google Forms and Class Marker. Fifty college students participated, and they were divided into three groups. The first group used Google Forms, the second group used Class Marker, and the last group used papers and pencils. The quantitative and qualitative data were collected using pretest/posttest, survey, and interview. The findings indicate that the students who took online quizzes had a higher average score in exam than the ones with written quizzes, with most reporting positive feelings about the two online tools. The findings suggest that online quizzes, if planned carefully, are more likely to help teachers construct better and faster assessment than traditional quizzes.

Keywords: Computer-Assisted Language Learning, Testing and Assessment

When we examine what comprises our assessment system in place, we have large-scale summative assessments that evaluate student proficiency against benchmarks once a semester, usually at the midpoint or the end of the semester. We also have formative assessments that monitor student growth periodically throughout that semester. By implementing formative assessments for students, teachers can track ongoing progress on a frequent basis, target specific problem areas, provide comments, and adapt instruction at the classroom level. However, creating formative assessments such as weekly quizzes is probably the most time-consuming activity for teachers, especially with large classes.

One possible solution would be to find a technical tool that saves teachers time and reduces their paperwork. Online quizzes provide different opportunities to help teachers to effectively integrate formative assessments into the classroom. First, large numbers of formative assessment can be easily managed with real-time reports, which includes performance data that teachers can use to shape instructional decisions. Even in a large class, the utilization can help teachers quickly identify struggling students and then offer feedback to immediately move the learning forward. Online Quiz Maker is one example of a technology that allows teachers to easily create and grade digital quizzes. After teachers sign up for an account and log in with username and password, they are allowed

to choose the types of questions they want in the quiz and the weight each question has. The kind of quiz can be shared with students via email or a direct link on social media. When students complete the quiz, their responses will be automatically marked and stored.

In Cohen and Sasson's study (2016), 240 undergraduates who enrolled in an introductory physics course took four written quizzes and four online Moodle quizzes that allow several attempts for formative assessment in eight consecutive weeks, one quiz each week. The researchers discovered the average score on both written and online quizzes is a strong predictor of the final exam performance. Most of the students who attained a score of 80 points or more in the quizzes had high scores on their final exams as well. The researchers also found that 76% of the students in an end-of-semester survey chose online quizzes when responding to the question "If you had the choice, which would you prefer- an online quiz or a written test?". A possible explanation for such preference is that the online quizzes allowed multiple attempts to complete the online quizzes while the written quizzes was set to only one attempt.

Tarighat and Khodabakhsh (2016) interviewed 17 advanced -level learners of English who recorded a two-minutes speech and shared the recording on WhatsApp, a social networking application, for their views and attitudes on the method used to assess their speaking proficiency. The learners reported that they experienced a lack of fairness when taking the WhatsApp assessment. Some students referred to other responses that had already been posted. In another study, Kocdar et al. (2018) surveyed 918 students from two universities, one school is in Turkey and one in Bulgaria, to find out whether or not students think an online test might affect the rate of cheating. Of all the 918 students, approximately 40 percent students ($n = 371$, 40.41%) held a neutral view of an increase in cheating. About one-third of students ($n = 311$, 33.88%), reported they did not feel cheating would be more likely to happen. Some students explained that test fairness can be ensured using video surveillance. However, other students ($n = 236$, 25.71%) provided a yes answer expressing their worries about "the implementation of e-assessment will create an even more favorable environment for cheating" (p. 229).

Siriwardhane and Tharapos (2013) interviewed seven accounting teachers for their perceptions of online testing at a university in Australia. The teachers all agreed that online testing was a useful assessment tool. Type of reasons provided by the teachers include online auto-grading tests substantially reduced the time to mark test items, and created instant results used to indicate students' understanding of that week's content and to inform the teaching for the following week. Like teachers, students generally prefer online tests over paper tests. In 2004, a survey was given to 46 male and female college students aged between 20 and 22 enrolling in a desktop publishing course at a university in Turkey (Ozden, Erturk, & Sanli, 2004). The results show that more students prefer web-based online tests over the paper, where a total of 78% of the students agreed to the statement *Better than paper-and-pencil form*.

Another study in 2014 presented the similar result (Berg & Lu, 2014). The vast majority of 46 students in an English writing course at a private university in Taiwan liked taking chapter tests on Moodle (65.3%), and they felt taking online tests is easier (69.6%) and less stressful (73.9%) than paper tests. In the study of Siriwardhane and Tharapos, the top two most negative factors affected exam performance perceived by students were: 1) note taking: Students were unable to write notes on the test; 2) speed of computer: Students did not complete the test within the time limit because computers in the lab ran slowly. Metz (2008) also found that the time of day in which students competed quizzes

affected their performance. Students in an advanced cell biology course were given a one-day access window to complete their quiz. Results show that students who took quizzes later were more likely to achieve lower scores by 10-15% than students taking quizzes early.

The ubiquity of mobile devices comes a set of possible disadvantages. Distraction is perhaps the biggest disadvantage among them. In a study conducted by Kuznekoff and Titsworth (2012), students who texted frequently during a video lecture took lower-quality notes, remembered less information, and had worse test scores versus those who did not use their mobile phones. Allowing smartphones in class create distraction, which affects students' ability to concentrate and hampers their performance because of that.

Mobile devices could be a boon if teachers consider the educational resources that can be found online. Digital textbooks, for example, make accessing resources easier. Online tests also provide instant feedback to users whether their answer is correct or not, and significantly reduce the time needed for conducting assessments. Unfortunately, not many language teachers are using it in their classroom. One of the reasons relates to a lack of understanding of the tools. Some schools may invest in new technology to support classrooms; however, they have not trained the teachers to properly use the solution to enhance their lesson plans. There is also security concern for online quizzes. Students may use their smartphones to store test questions, search for information, or help others in finding answers, while taking their quizzes online.

After the pandemic hit, online quizzes stimulated research interests. Yet much attention has been directed to the effect of a particular app on a learner's knowledge. Limited number of studies were conducted to help us understand student perceptions of using mobile phones for language testing. To fill the gap in this under-explored area, our study aimed at assessing students' perceptions about mobile-assisted language quizzes. A secondary purpose was to determine student accuracy using vocabulary and reading comprehension skills with two different methods of administering quizzes: face-to-face and online. The study was guided by the following research questions:

- **RQ1.** What is the relationship, if any, between the use of online quizzes and posttest scores?
- **RQ2.** What are the students' perceptions towards online quizzes versus traditional paper and pencil?
- **RQ3.** What are the factors that affect students' experience with online quizzes?

Methods & Procedures

Subjects

The study took place at a private university in Taiwan. Fifty first-year students enrolled in a 2-year undergraduate nursing program participated. These students were between 19 and 21 years of age, 46 were females and 4 were males, with an average TOEIC score of 307. Students took an EFL (English as a foreign language) course required in their first semester. The course comprised 18 weeks of 110-minute teaching and focused on providing students with instruction and practice in academic English. Six reading passages were assigned in advance, and each contained 600-800 words related to a specific topic.

Students who registered for the EFL course were approached by the same course instructor to discuss the research agenda. The instructor informed the students that the courses would be facilitated using either paper-based or one of two e-assessments: Google

Forms or Class Marker. The instructor provided an explanation of how the systems worked. Next, the students were asked for their consent with a choice to opt out of the study. Their course grades were not affected by their decision in any way. The students were guaranteed that their names and academic records were not going to be included in the study. Then, the participants were assigned to their separate groups using a random number generator. The first group (G1) with a total of 17 students took Google Forms Quizzes; the second group (G2, n = 17) took Class Marker Quizzes; and the last group (G3, n = 16) took written quizzes.

Procedures for Creating Quizzes in Google Forms and ClassMarker

The software community has developed tools that help language teachers author and compile questions into online quizzes that can be used to evaluate student progress in today's connected classroom. To choose the application that best suited our study, we created selection criteria. This included the function of creating quizzes with mixed question types, a time limits feature, cost-free, automatic grading, and providing individual and overall feedback in real time. Considering the selection criteria above, the research team chose Google Forms and Class Marker.

Researchers have advocated Google Forms for creating tests or quizzes because it is a free tool that allows teachers to include 11 different basic types of questions, such as multiple question, pull-down, and short answers (Suvorov & Hegelheimer, 2013; Unser-Shutz, 2018). Although teachers need a Google account (the same they need to access Gmail), students do not need one to respond. Once students complete the quiz, Google Forms will be able to generate a report with student responses, to summarize the results in graphic form, and to convert the report into usable spreadsheets in Excel.

Class Marker is another widely used online quiz maker (www.classmarker.com). It is free for individual teachers. It is easy-to-define test settings allows teachers to quickly create and give online quizzes to exact requirements with features such as time limits, randomize questions, instant feedback, and private access. Test results are also automatically graded and viewable in real time. To create a ClassMarker quiz, after login, the creators need to go to the Tests on the dashboard page, click on New Test, enter a quiz name, and add/edit questions in their new quiz.

Research Design and Instrumentation

The study used a mixed-methods research design, combining two quantitative components and one qualitative component. The researchers considered two major design characteristics. First, the goal of using mixed methods was to expand and strengthen our study's conclusions (Schoonenboom & Johnson, 2017). Another design dimension related to the timing of the two components. Interviews were conducted immediately following the post-test to best record the participants perceptions of the efficacy of the online quizzes. Quiz scores were used to test the hypothesis predicting that the students using mobile-assisted quizzes would not have higher scores than the students using paper-based quizzes. The survey and interview results were used to understand how students responded to online assessments and its two technology enhanced variations when it came to the three characteristics of a mobile-based assessment system: user interface, navigation, and effect on learning progress. A focus group interview protocol was prepared based on Jacob and Furgerson (2012).

The protocol had six questions:

1. Which area needs improvement first?
2. Does the interface of this mobile based assessment system have elements that are easy to access, understand, and use to facilitate what users might need to do?
3. Is the system easy to learn how to use and easy to remember how to use?
4. Does the use of this mobile based quiz have a positive effect on learning progress?
5. What are the difficulties of online quizzes using smartphone or mobile device?
6. What did you like at most when taking quizzes on your smartphone or mobile device?

The participants who signed the consent form chose a convenient time slot to attend the focus group. Focus groups involved approximately 6-8 participants and lasted from 30 to 60 minutes. The interviews were originally conducted in Mandarin Chinese, digitally recorded, and later transcribed into English by the principal investigators and his research assistants. The students' accuracy using their vocabulary knowledge and reading comprehension skills was measured by their performance on pretest and posttest written by the research team. The two tests were used as a summative tool to assess students' reading and vocabulary skills that they learned in the class, and to detect any change that online quizzes brought to their performance. Both tests had the same 50 multiple choice questions, with randomized question order. Each question was worth two points. The pre-test was given in week 1 and the post-test in week 18. One of our co-investigators worked together with a research assistant to score all summative exams with an answer key.

Before starting to use Google Forms, the teacher held a 20-minute introductory session with a PowerPoint or Keynote presentation in the classroom and checked whether students would be able to access the quizzes. Students were asked to (a) visit Google Form quiz page and sign in with their Google account, and (b) respond to questions. The teacher worked with the students who needed assistance with the service. One example of quiz question is *For exercise Alice ___ lifting weights, swimming and jogging*, and four answer options are *resembles, loads, alternates, and fabric*.

To prevent cheating on Google Form quizzes, as a first step, we considered using the shuffle option order feature which changed the order of answer choices in each multiple-choice question. It would make it more difficult for students to copy answers from a classmate. As a next step, we enabled locked quiz mode. This mode would prevent students from browsing other websites or opening any other apps while during online quizzes.

Before introducing Class Marker, one of the authors gave a short class presentation that walked students through the steps to take a quiz in Class Marker: each student (a) receives a link in an email sent out to them by the teacher (b) clicks the quiz link and accesses the test (c) responds to question and taps Finish Now to finish the quiz.

Data Collection Procedure

The groups met once a week for eighteen weeks. At the end of each two-week session, the teacher gave students a quiz based on the reading assigned for that session (during week three, five, seven, eleven, thirteen, fifteen). Each quiz had 10 multiple choice questions, 5 vocabulary questions and 5 reading comprehension questions. A correct answer earned 10 points. The quiz had a time limit of 10 minutes. All the three groups in the study were given the same quiz activity in the same week by the same teacher. The only difference between these groups was the method of testing. In the G3 class, the

teacher gave paper-based formative quizzes to students. In the G1/G2 classes, the teacher gave online quizzes in Google Forms or Class Marker. The authors used the free versions of Google Forms and Class Marker, which provided a fully functional testing environment. The team registered users, created and assigned quizzes, randomized questions, and saved and reviewed test results instantly.

The pretest was administered by the PI and a trained student research assistant to all 50 students in the 1st week of the program, and the posttest in the 18th week. One-way Analysis of Variance (ANOVA), a data analysis procedure for comparing the means of three or more groups and for assessing whether they are statistically different from each other, were used to see which approach creates a highest level of academic performance in large classes. The independent variable (IV) in the study was the type of quiz activity (paper-based, Google Forms, and Class Marker), whereas the dependent variables (DV) was students' test scores.

A five-point Likert scale questionnaire (6 questions) was administered to all participants in G1, G2, and G3. It featured 6 questions and solicited useful information on online quizzes being offered from respondents. In addition, individual interviews that involved only G1 and G2 students were conducted face-to-face by the PI/Co-Investigators. After we collected the data, we developed a set of codes obtained either from the researchers' prior knowledge of online assessments or from reading the interview transcription. We examined the data and conducted the coding in two levels. At the first-level coding, we divided responses into positive and negative perceptions. During the second level of coding, we read through each response and smaller topics began to emerge from the data.

Results

Pretest and Posttest

The results show the pretest ($p = 0.64$) was insignificant, meaning the three groups were equal (see Table 1). The average posttest score of G1 (Google Form) and G2 (Class Marker) was 12.11 and 16.94 points higher than pretest, while that of G3 (Classic) was 9 points higher than pretest. Of the three groups, G2 showed highest gains. The p values of t -test within each group range from .0001 to .0141.

Table 1
Pretest and Posttest Scores

Group	N	Pretest				Posttest				t Test
		SD	M	Min	Max	SD	M	Min	Max	
G1	17	10.27	61.18	36	78	10.79	73.29	52	94	$p = 0.0021$
G2	17	9.43	62.00	42	80	9.70	78.94	60	94	$p = 0.0001$
G3	16	7.71	64.13	50	76	11.45	73.13	54	92	$p = 0.0141$
		<i>ANOVA</i>	$F = 0.44, p = 0.64$			<i>ANOVA</i>	$F = 1.62, p = 0.21$			

Note. N = number of participants, SD = standard deviation, M = mean, Min = lowest score, Max = highest score, F = F -ratio, p = p -value.

Pairwise comparisons within ANOVA data were facilitated using the Tukey’s honestly significant difference procedure (see Table 2). There is no significant difference between the various pairs of means.

Table 2
P-Value of Pairwise Comparisons

Group	Pretest	Posttest
G1:G2	0.96	0.29
G1:G3	0.63	1.00
G2:G3	0.79	0.27

Table 3
Students’ Survey Responses about Quizzes

# Statement	G	SD	D	N	A	SA	M
1 Quizzes helped me learn the material in the course.	G1	0	0	0	6	11	4.65
	G2	0	0	0	8	9	4.53
	G3	0	0	0	9	7	4.48
2 Quizzes helped me study for final exam.	G1	0	0	3	5	9	4.35
	G2	0	0	2	6	9	4.41
	G3	0	0	2	7	7	4.31
3 It was helpful to review the questions after each time I took the quiz.	G1	0	0	0	6	11	4.65
	G2	0	0	2	7	8	4.35
	G3	0	0	2	7	7	4.31
4 Each quiz made me read the assigned reading in my textbook.	G1	0	0	3	6	8	4.29
	G2	0	0	3	4	10	4.41
	G3	0	0	2	5	9	4.44
5 Quizzes made me more likely to attend classes.	G1	0	0	0	7	10	4.59
	G2	0	0	0	7	10	4.59
	G3	0	0	0	10	6	4.38
6 Quizzes should be used in other English language courses.	G1	0	0	9	4	4	3.71
	G2	1	2	4	5	5	3.65
	G3	0	2	6	5	3	3.56

Note. G = group, SD = strongly disagree, D = disagree, N = neutral, A = agree, SA = strongly agree, M = mean.

Survey

The majority of participants, across all groups, responded favorable to the quiz, answering that they found it helpful and motivating (see Table 3). In response to the statements, “Quizzes helped me learn the material in the course” and “Quizzes made me more likely to attend classes,” all respondents agreed or strongly agreed. Similarly, most respondents agreed that the quizzes was helpful for studying for the final exam. 14 out of 17 respondents either in G1 or G2 (14 out of 16 in G3) agreed with the statement “Quizzes made me more likely to do the readings.” When asked whether quizzes should be used in

other English language courses, approximately half of respondents agreed (G1, 52.94%; G2, 58.82%; G3, 50.00%).

Interview

The qualitative data was collected by the use of focus groups. The themes that emerged from the students’ responses are ease of use and accessibility, positive learning attitude, better attendance and punctuality, increased confidence, and early exam preparation (see Table 4).

Table 4
Themes and Quotations

Themes	Student Quotations
1. Ease of use and accessibility	“The app feels easy to use.” (G1) “I get immediate feedback.” (G2)
2. Positive learning attitude	“The quizzes force me to actually read each assigned reading in my textbook.” (G1) “If I miss a question, I will pay attention to the information I need. So I will not miss the question again” (G2)
3. Better attendance and punctuality	“I show up for class on time.” (G1) “I attend class regularly because missing a class will affect my grade.” (G2)
4. Increased confidence	“I feel more confident to discuss the material.” (G1) “My confidence grows when I challenge myself to take quizzes but are able to succeed.” (G2)
5. Early exam preparation	“I start putting time aside to revise the topics at least two weeks prior to the final exam ” (G1) “Quizzes that cover major learning points in the course allow me to see what I already know and do not know.” (G2)

Discussion

The first research questions were how the online quizzes were related to test scores and if they improved summative test scores more greatly than written quizzes did. All students’ scores seemed to be affected to the similar degree by quizzes over class material about once every two weeks, whether they were online or on paper. This result may be explained by that fact that quizzes helped students practice what they had covered, then consolidated that knowledge. Another possible explanation is the similarity between the format of the quizzes and that of posttest. The posttest in this study included multiple-choice and fill-in-blanks questions that were similar to quiz questions. However, the number of G1 and G2 students (6, 10) whose posttest scores fall in the range of 80-100 points was higher than G3 (5), which suggests online quizzes might help students improve their vocabulary and reading comprehension more efficiently. The growth in test scores is perhaps because the apps act as a personal tutor who can provide immediate personalized feedback, telling students if they have answered incorrectly, and giving direct instruction prompts or explanations (pre-made by teachers) to help students learn how to answer correctly. This finding is consistent with the findings of DeSouza and Fleming (2003) and Dobson (2009), which also mentioned the use of formative online quizzes enhanced summative

exam performance.

Among the two groups taking online quizzes, G2 showed greater gains than G1 in posttest scores. This discrepancy could be attributed to the use of a stopwatch and a detailed performance report. When G2 students used Class Marker, they had a stopwatch that reveals the elapsed time on the top of their application window. That stopwatch could help students focus on their work and avoid distractions. Compared to Google Forms, Class Marker also gave a more detailed report of student responses. For example, students had access to their point and percentage scores, date started and finished, and the duration of the quiz. Including more valuable information in the report may help students more easily understand what they were learning and how they learned.

The second and the third research question were how students perceived online quizzes and what factors influenced students' experience using online quizzes. The three groups of student participants expressed a positive view of their respective quizzes. Although written quizzes required more time than online quizzes, it should be noted that this mode of teaching is still an effective method of assessment. The interview data collected revealed five main themes: ease of use & accessibility, positive learning attitude, better attendance & punctuality, increased confidence, and early exam preparation. The most common comments related to the tendency to go back and re-read the certain parts of the chapters/articles. The satisfaction students had when their expectations of knowing the answers went fulfilled quickly is partially responsible for their continuous exploration or motivation to learn. Based on other comments, it appears that students in this study welcome the idea of teachers giving two or more quizzes for each assigned reading. When students perceive online quiz as supportive learning tool to excel in exams, their desire to take advantage of the benefits of online quiz comes up.

Most teachers would agree that online quiz tools are one of the best available technology for assessments. It avoids use of paper, and saves time and energy involved in the chaos of maintaining paper records. For teachers, online quizzes are like an upgraded technique that makes classroom assessment rather easy. The shuffle feature that Class Marker and many other apps have allows teachers to randomize quiz questions, helps reduce student cheating. Another advantage of online quizzes is the instant reports generated on the quizzes. Those reports are detailed enough for teachers to measure how well students currently understand the topic and to address student weaknesses or misunderstandings by the time it is too late for students to be interested, using proper error correction strategies including modeling the correct answer, explicit correction with a little humor and recasting.

This study had two limitations. First, it was only conducted with first year nursing students. The results would not happen again with other students with differing levels of proficiency at other universities. Different contexts might reveal different results. The second problem was the small sample size, which decreases statistical power of the study and reduces the chance of detecting a true effect. However, the findings of this small study reveal that students have positive perceptions on the use of online quizzes and that factors such as the timing of feedback affect student experience. Future studies with a larger sample size and longer research period are required to further investigate the relationship between formative online quizzes and summative exam scores.

Conclusion

The results of this exploratory study can inspire teachers and school leaders to consider

possible implementation of online quizzes when they return to face-to-face classes. In terms of formative assessment efficiency, online quizzes should be the preferred approach as it not only provides students with immediate precise feedback that improves their confidence and motivation to learn, but also offers assistance to teachers who use formative assessment to scaffold student learning. Teachers should also introduce the online quizzes with a carefully organized procedure to ensure successful utilization.

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Appendix A Pretest & Posttest Questions

Sample Multiple-choice Question

For exercise Alice ___ lifting weights, swimming and jogging.
A. resembles B. loads C. alternates D. fabric

According to the passage “Successful Dieting,” which of the following statement is true?

- A. JudyGirl asks for advice about fad diets.
- B. JimGym points out that food is the major problem of weight control.
- C. Desserts made with white flour are not good for weight control.
- D. JudyGirl has kept off the weight for three years.

Sample Fill-in Blanks Question

I have tried every kind of diet. Fad diets haven’t done the trick for me, 1 . The problem is that 2 you eat too much of one kind of food and get fed up 3 , or you don’t get enough of the foods your body needs. So when you stop, you eat too much of the foods that weren’t on the diet and the weight comes back.

- 1. A. nor B. neither C. either D. too
- 2. A. nor B. neither C. either D. too
- 3. A. of B. with C. in D. for

Appendix B Questionnaire

- 1. Quizzes helped me learn the material in the course.
- 2. Quizzes helped me study for final exam.
- 3. It was helpful to review the questions after each time I took the quiz.
- 4. Each quiz made me read the assigned reading in my textbook.
- 5. Quizzes made me more likely to attend classes.
- 6. Quizzes should be used in other English language courses.

Appendix C

Interview Protocol Matrix

Script prior to interview:

We would like to thank you once again for being willing to participate in the interview aspect of our study. We are very interested to know how students think about online quizzes. Our interview today will last approximately 30 minutes during which I will be asking you about your ideas that you may have about Google Form/ClassMarker quiz.

Review aspects of consent form:

In class, you completed a consent form indicating that we have your permission (or not) to audio record our conversation. Are you still ok with us recording (or not) our conversation today?

Yes If yes: Thank you! Please let us know if at any point you want me to turn off the recorder or keep something you said off the record.

No If no: Thank you for letting me know. I will only take notes of our conversation.

Before we begin the interview, do you have any questions? If yes, discuss questions.

If any questions arise at any point in this study, you can feel free to ask them at any time. I would be more than happy to answer your questions.

Question #1:

Which area needs improvement first?

Question #2:

Does the interface of this mobile based assessment system have elements that are easy to access, understand, and use to facilitate what users might need to do?

Question #3:

Is the system easy to learn how to use and easy to remember how to use?

Question #4:

Does the use of this mobile based quiz have a positive effect on learning progress?

Question #5:

What are the difficulties of online quizzes using smartphone or mobile device?

Question #6:

What did you like at most when taking quizzes on your smartphone or mobile device?

Script after interview:

Thank you for taking the time to meet with us. It was a pleasure to learn more about your experience of using online quizzes.