

**The Effects of Pre-Lecture Online Quizzes on
Language Students' Perceived Preparation and
Academic Performance**

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Abstract

This study used a post-test-only control group experimental design to determine the effects of pre-lecture online quizzes on the students' perceived preparation and academic performance. The participants included 54 pre-service Turkish teachers of English enrolled at a state university in Turkey. The participants were randomly selected from a list and were assigned to two sections: control and experimental groups. The students in the control group were not required to take the online quizzes, while the ones in the experimental group were asked to complete the pre-lecture online quizzes. The results showed that the participants in the experimental group scored higher on the final examination at the end of the semester than those in the control group and that a significant positive correlation existed between the scores on the quizzes and the scores on the final examination. Moreover, the participants in the experimental group reported that they prepared for the classroom discussions having learnt the key terms and concepts since the online quizzes urged them to do the required readings.

Keywords: online quizzes, pre-lecture, assessment, university students, assigned readings

Introduction

Assessment is ubiquitous in any educational contexts since it serves several functions such as monitoring teaching and learning, accountability, and improvement. Through these functions, assessment of learning and teaching activities inform any stakeholder concerned of the success and failure, providing invaluable feedback on what is needed to overcome the barriers to learning and teaching as well as to ensure further improvement (Klinger, 2016). Therefore, in contrast to the common belief that assessment is conducted to determine the learners that will 'pass' or 'fail', the driving force behind assessment practices is to determine the strengths and weaknesses in the learners' performances and to act accordingly.

An almost universally notion accepted by teachers and others is that when students are given continuous assessment through mini exams such as quizzes and do well on these tests, they will also do well on the final examinations, which has been confirmed by several studies (McDaniel, Widman, & Anderson, 2012; Wambuguh & Yonn-Brown, 2013; Brown & Tallon, 2015). Bangert-Drowns, Kulik, and Kulik (1991), for example, conducted a meta-analysis on several studies analyzing the effect of frequent testing and found that the participants taking at least one test during a 15-week term increased their scores on the criterion exams compared to the ones that were not tested. It was also found that the improvement in terms of achievement decreased as the number of the tests (notably long tests) increased, indicating that when tests were used as diagnostics tools and supported with remedial help, it led the students to perform better while the gains obtained got smaller with the each test added to the course. The meta-analysis stressed the superior performance of the students when they answered the questions on a large number of short tests rather than the long ones. However, despite the positive effect of frequent testing through short tests, research on testing indicates that teachers do not test their students as often as possible. Numerous

problems have been identified such as the increased number of students, the pressure on staff to teach a variety of courses, the time required to grade, and to give feedback to learners, leading to a reduction in the number of assessment of students regularly. Arguably, the ideal solution to this problem is to assign online quizzes to students outside the classroom through some websites where grading is done instantly and feedback is provided for each and every question as Hattie (2009, p. 181) indicates

...the power of feedback to teachers on what is happening in their classroom so that they can ascertain “How am I going?” in achieving the learning intentions they have set for their students, such that they can then decide “Where to next?” for the students.

New technology, especially mobile devices (Chinnery, 2006), appears to be effective for delivering online quizzes and allows transforming paper-and-pencil tests to digital assessment instruments (Brown, 1997) through which students’ performances are assessed easily and practically. Online quizzes, therefore, can be considered ‘assessment actors’, which provide teachers with the opportunity to check students’ understanding as well as application of previously-learnt items (Turner & Purpura, 2016).

Literature Review

Several studies examined the use of online quizzes in educational settings. While some studies mainly focused on the students’ attitudes (Lu, 2009; Dumova, 2012; Dashtestani, 2015; Arora, Evans, Gardner, Gulbrandsen, & Riley, 2015), many focused on the effects of using online quizzing mainly on students’ academic achievement and preparation for the classroom (Galizzi, 2010; Kibble, 2011; Stull, Majerich, Bernacki, Varnum, & Ducette, 2011; McDaniel, Widman, & Anderson, 2012; Brown & Tallon, 2015).

Regarding the students’ attitudes toward online quizzing, Lu (2009) found that pre-class online quizzing motivated participants to

cover assigned reading materials and come to class having read the materials. In a similar study, Dumova (2012) examined the use of online quizzes and students' attitudes to these online quizzes. Based on the results of the study, it was concluded that the online quizzes were determined to be practical in terms of use as well as user-friendly. It was also indicated that the students had positive attitudes towards online quizzing and expressed preference for online testing over the traditional tests. Dashtestani (2015) analyzed the EAP students' attitudes towards the use of web-based language tests aimed at assessing students' knowledge of academic vocabulary. The participants of the study included four groups of 30 undergraduates from different fields of study such as Biology and Psychology. The results indicated that the great majority of the participants had positive attitudes towards web-based language tests on academic vocabulary and provided several advantages such as immediate feedback, multimedia features, and feedback on each question. The findings of the case study (Arora et al., 2015), which aimed to improve students' engagement in a literary theory course and to facilitate learning complex concepts, indicated that the participants' attitudes towards online quizzes on the key concepts were positive. The online quizzes given before the face-to-face classroom helped the students prepare for the upcoming classroom discussions.

Several other studies focused on the effects of online quizzes on students' academic performance and preparation for the classes. Galizzi (2010), for example, studied the effects of online homework quizzes created by the textbook publishers in introductory and upper level classes on Economics in a public school. The participants of the study were asked to complete six online quizzes on six chapters of the coursebook. Multiple-choice questions were found to be reasonable predictors of the participants' performance in the exams. It was also found that the participants reacted positively to the use of online quizzes. In another study, Stull et al. (2011) investigated the effects of formative assessment conducted through pre-lecture online quizzes on students' content achievement. The participants of the study included 112 students, who are divided into two sections of an undergraduate

course on educational assessment. The results revealed that online quizzes on the chapters of the course content had a significant effect on student achievement and informed the instructor as well as the students of their progress and the needs of further study. Kibble (2011) conducted a study with 109 undergraduate students enrolled in a human physiology course. Before the study, the participants were informed of the nature and purpose of the formative assessment through online quizzes and how completing online quizzes would enhance their performance in the class, how to benefit from the strengths and to account for the weaknesses that would be indicated by the results of the online quizzes. The results confirmed that the participants who completed the online quizzes scored 13% higher on the summative examination compared to the other participants who did not. McDaniel et al. (2012) examined the effects of online quizzing through multiple choice and short-answer questions, leading to the conclusion that unsupervised online quizzing in a college course enhanced exam performance. Brown and Tallon (2015) examined the effects of pre-lecture quizzes on the anxiety and performance of students enrolled in a statistics class. The experimental group completed the paper-based pre-lecture quizzes, while the control group did not. The participants in the experimental group scored higher in the exam and improved their performance in the class. They also stated that they felt better prepared for the class.

Contrary to the findings of the previous studies, some other studies found that online quizzes or questions did not affect student performance. One study conducted by Harter and Harter (2004) investigated whether online quizzes would lead to an increase in student performance in an undergraduate Economics course. The quizzes were created in the format of multiple-choice questions with four possible choices. The results indicated that using online questions did not affect student performance on multiple-choice questions on the final exam of the course. However, it was noted that the participants' attitudes were positive towards the use of this kind of technology. Similarly, Urtel, Bahamonde, Mikesky, and Vessely (2006) studied the effects of online out-of-class quizzing on classroom engagement,

academic performance, and preparation perception. The results of the study revealed that online quizzing had a statistically significant impact on student classroom engagement. However, it was noted that online quizzing did not lead to higher scores on the given tests. In another study, Palocsay and Stevens (2008) analyzed the effectiveness of custom-made online quizzes offered through web-based homework to university students enrolled in the class of undergraduate Business statistics. The online quizzes included multiple-choice questions, whose options ranged from two to five choices. The findings revealed that the participants' success was not significantly affected by the technique used to deliver quizzes. It was pointed out that student success and performance depended on other factors such as teacher experience and student academic performance.

The empirical literature reviewed on the role of online quizzes in educational contexts has been characterized by both similar and mixed findings across studies and contradictory results within studies. The most common finding shared by many studies is that students have positive attitudes towards online quizzes and that they prefer online testing to the traditional printed quizzes. Several factors can be stated to contribute to this finding such as motivating students to cover the required readings and immediate feedback provided. However, the contradictory results are rampantly seen in the studies conducted to investigate the effect of online quizzes on students' academic performance. While several of the studies indicate that students' performance increased due to online quizzes, other studies indicate that online quizzes do not affect student performance. Although these studies investigate the use of online quizzes and its effects, to the best knowledge of the researcher, there are few studies that investigate the issue from both quantitative and qualitative perspectives, especially in a foreign language education context, which will shed light more on students' views.

The Aim and Importance of the Study

The present study therefore investigated the extent to which language students' preparation for classes and their academic performance on the final exams were affected by pre-lecture online quizzes. The study also aimed to find out the benefits of pre-lecture online quizzes provided to both students and teachers. The online quizzes were created as multiple-choice questions, aiming to encourage the participants in the experimental group to come to class having read the required readings and to function at the 'Remember' and 'Understand' levels of the revised version of Bloom's taxonomy (Krathwohl, 2002) so that they could recall basic information covered in the assigned readings. To the best knowledge of the author, few studies have examined to what extent the perceived preparation and academic performance of undergraduate students, especially, language students, are affected by the use of pre-lecture online quizzes. Therefore, the present study will fill this gap in the literature and try to touch upon the effects of pre-lecture quizzes in the tertiary context.

This study has addressed the following research questions:

- (1) Is there any statistically significant difference between the control and experimental groups regarding their scores on the final exams?
- (2) Is there any relationship between the average quiz scores of the participants in the experimental group and their scores on the final exam?
- (3) What are the views of the participants in the experimental group on preparation for the classroom discussions?
- (4) What are the perceived advantages and disadvantages of using online quizzes?

Methodology

Sample of the study

The study was conducted in the department of foreign language education at a public university in Turkey. The participants of the study included 54 undergraduate (senior) pre-service Turkish teachers of English enrolled in an introductory Language Testing and

Evaluation course taught by the researcher. The course aimed at teaching students how to write, implement, and evaluate a variety of testing instruments for a specific group of language learners. To achieve this objective, several issues were included in the syllabus such as backwash, varieties of tests, test validity and reliability, stages of test construction and testing overall language proficiency, and individual skills (e.g., writing, reading, listening, speaking). The participants were randomly selected from a list and assigned to two groups. The control group included 27 students (23 females and 4 males); the experimental group consisted of 27 students (25 females and 2 males). The average age of the students was determined to be 22.43.

Online web-based quiz system and materials used

QuizStar, available at quizstar.4teachers.org, was used to create the pre-lecture online quizzes for the participants in the experimental group since it allows creating multiple-choice question easily and without the need to deal with any codes (Kılıçkaya, 2010). *QuizStar* is a free online web-based quiz creation tool that allows creating and designing online quizzes. It automatically analyzes the responses to the questions in a quiz and grades responses just in seconds. The performances of all the students taking the quizzes are provided in detail using graphs. Different quizzes can be assigned to different classes, which is very useful when teachers have more than one class or teach different subjects. Multimedia resources can be attached to the questions, and the quizzes can be accessed by using any electronic device, be it a tablet or a smartphone, which is connected to the Internet. As previously explained, it is not needed to install any software since all required is an Internet browser and a device connected to the Internet.

Ten pre-lecture quizzes were prepared by the researcher for the assigned readings in the course book authored by Brown and Abeywickrama (2010). The quizzes each included 10 multiple-choice questions related to the materials/readings to be covered on that week (Figure 1).

Figure 1: An example question on QuizStar

TYPES OF TESTS

Quiz Directions

Directions:

1. Answer the questions below by clicking the button next to the best answer choice or typing your correct answer. Each question's answers are in grey.	2. At the end of every page click the next button to move forward to the next page. DO NOT HIT THE BROWSER'S BACK BUTTON!	3. On the last page of the Quiz you will be able to see which questions are unanswered, are answered and have been flagged.
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questions:

1. TOEFL and IELTS are examples of ----- tests, which are always summative and norm-referenced.
1 pts.

- A. diagnostic
- B. proficiency
- C. placement
- D. achievement
- E. aptitude

Flag this question for later review

The multiple-choice questions aimed at assessing whether students had completed and understood the basic concepts/ideas presented in the assigned readings. Therefore, the questions were created at the levels of 'Remember' and 'Understand' in Krathwohl's (2002) revised version of Bloom's taxonomy. The questions in the quizzes were presented item by item. That is, on the screen, students could only see one question at a time so that they did not have to scroll the screen to see the question (Walker & White, 2013).

The quizzes, validity, and reliability

The online quizzes (10 pre-lecture quizzes, and 100 multiple-choice questions in total) were validated by an English language-testing specialist, considering the readings assigned for each week. Based on the comments and suggestions pointed out by the specialist, several modifications were introduced to the questions. The finalized quizzes were also administered to the senior students at the department of foreign language education at another university. The test reliability was obtained using the test-retest method. The reliability correlation coefficient was determined to be .82.

Treatment

Before the semester started, the researcher prepared the syllabus including the assigned readings. The participants were randomly selected from a list and assigned to two sections: control and experimental groups. The participants in the experimental group were told that they were participating in a research study, and that the main aim of the research study was to improve teaching and learning. However, the details about the study were not discussed. The students in the control group were not required to take the online quizzes prepared, while the ones in the experimental group were asked to complete the pre-lecture online quizzes and informed that their scores obtained on these quizzes would affect the course grades (10%). The participants were taught by the same instructor and through the same content and class hours.

The same final examination including several short-answer as well as application questions was given to the students in both groups. Moreover, it was also checked whether there was any relationship between the average quiz scores of the participants in the experimental group and their final scores. As is widely acknowledged that quality of the platform used, or more importantly, computer familiarity may influence scores obtained on online exams (Roever, 2001; McDonald, 2002; Bennet, 2003; Clariana & Wallace, 2002; Wang, Jiao, Young, Brooks, & Olson, 2008; Kingston, 2009; Davidson & Coombe, 2012), a one-hour seminar was held with the participants in the experimental group. During this seminar, the web-based testing system (Quizstar) was introduced to the participants, and they were asked to create student accounts. Moreover, as it would not be possible to monitor students whether they would be doing online quizzes on their own or with others' help, the participants were asked to sign a code of conduct agreement, stating that they would do all the online quizzes on their own.

The class was held on Wednesdays, and the students were assigned a chapter that included 20-25 pages to read each week. A specific time and day (on Tuesdays, at 21.00) was determined to do the quizzes, and a 10-minute timer was enabled for each quiz. The

participants were asked to do the quizzes on their own within the determined duration. Feedback on both correct/incorrect responses was provided to students for each question, explaining the answer and referring to the specific page on the course book. No multimedia was used in the questions. These online quizzes were provided only as a supplemental study aid for the students. The researcher did monitor students' performances on the quizzes and incorporated them into course grades. Based on the responses provided to the questions and the results saved by the system, the researcher determined which concepts were grasped by the participants and which ones needed further attention. Therefore, the weaknesses and strengths were taken into considering during the lecture and discussions on the next day.

Quantitative and qualitative and approaches to data collection were adopted in the study. In order to seek answers to the first and second research questions, an independent-samples *t* test and Pearson product-moment correlation coefficient were calculated. For the third and the fourth research questions, semi-structured interviews were conducted with randomly selected participants ($n = 15$) in the experimental group. The data collected from these interviews were subject to content analysis in which the responses were coded for themes and patterns. The researcher prepared the transcripts of these interviews and shared these with an expert in English language teaching to ensure the credibility of the themes and patterns. Several meetings were held with the expert to determine the codes as well as to compare these codes.

Analysis and Discussion

In order to seek an answer to the first research question and to evaluate the hypothesis that there is no difference between the groups regarding the scores on the final exam, an independent-samples *t* test (Table 1) was conducted. The calculation indicated that the test was statistically significant, $t(52) = -3.267$; $df = 52$ $p = .002$, leading to the rejection of the null hypothesis (Table 1). The participants in the experimental group with online pre-lecture quizzing ($M = 77.41$, $SD = 9.361$) on the average scored higher than those in the control group

with no online pre-lecture quizzing ($M = 67.81$, $SD = 12.045$). Further, Cohen's effect size value ($d = .88$) suggested a large practical significance.

Table 1: Post-test results

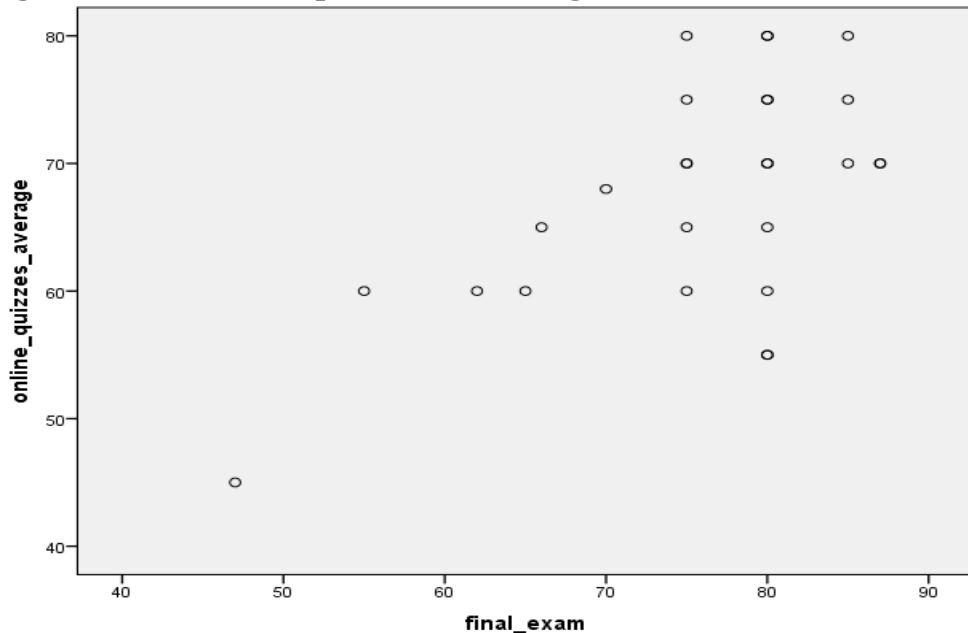
	Group	N	M	SD	SEM	F	t	df	Sig.
Post-test	cont.	27	67.81	12.045	2.318	4.935	-3.267	52	.002
	exp.	27	77.41	9.361	1.802				

In order to answer the research question of whether there is any relationship between the average quiz scores of the participants in the experimental group and their scores on the final exam, a Pearson product-moment correlation coefficient was computed. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. There was a moderate positive correlation (Evans, 1996) between the two variables, $r = 0.59$, $n = 27$, $p = 0.001$ (Table 2). A scatterplot summarizes the results (Figure 2). The increase in scores obtained on quizzes was correlated with the increase in the scores obtained on the final exam.

Table 2: The Pearson correlation coefficient calculated to determine the relationship

		online_quizzes_ average	final_exam
online_quizzes_average	Pearson Correlation	1	.595**
	Sig. (1-tailed)		.001
	N	27	27
final_exam	Pearson Correlation	.595**	1
	Sig. (1-tailed)	.001	
	N	27	27

** Correlation is significant at the 0.01 level (1-tailed).

Figure 2: The scatter plot summarizing the results

In order to respond to the last two research questions and to explain the results obtained from quantitative analyses, semi-structured interviews were held with some of the participants in the experimental group. The themes and the codes in addition to the example responses that emerged from the semi-structure interviews have been provided in Table 3. The selected quotations voiced by the participants are the most representative of the responses provided during the interview sessions.

The semi-structured interviews conducted with the randomly selected 15 participants in the experimental group revealed that pre-lecture online quizzes guide them through the chapters to determine the basic concepts to learn. Furthermore, the online quizzes helped the participants to get ready for the classroom discussions.

Table 3: Coding Scheme

Themes	Codes	Examples
Preparation	Guidance Ready for discussions	'The questions on the quizzes helped me to decide on which topics/terms I need to study for the classroom discussions.'
Learning	Reinforcement Repetition	'The quizzes encouraged me to read the chapters in advance. The lectures have complemented and reinforced what I learned.'
Feedback	Prompt Detailed Scoring	'When I completed the quizzes, I got quick and detailed feedback on my performance. I learned my score as well as the pages where I could re-read the material.'
Participation	Self-confidence Low anxiety	'I used to attend the classes without reading the materials. But, the quizzes forced me to read the chapters. I was confident that I could pass the course as I was able to talk on the materials.'
Classroom time	Effectiveness of discussions and activities	'I knew the important concepts and terms. So, the lectures were clear and understandable to me. We spent more time on practical aspects of language testing with real life examples.'
Quiz Delivery	User-friendly Simple	'The website that we used was easy to use and fast. I got detailed report on my performance.'
Technical Issues	Internet connection lost Computer breakdown Quiz security	'The internet connection that I used was sometimes bad. There happened to be times when there was no internet connection. I could not do some of the questions on some quizzes.'
		'I know that some of my friends in the class did the questions together. I think we should do the quizzes in the lab to maintain proper conduct of a particular examination.'

One of the participants expressed how these quizzes helped in her preparation for the classroom as follows:

In order to answer the questions on the quizzes, I knew that I had to read the chapter for that week. I had to do this in advance. After reading the chapter in detail, I answered the questions. The questions informed me of the key things that I needed to learn (Interviewee 11, Female).

The great majority the participants (n=13) pointed out the role that pre-lecture quizzes played in reinforcing learning in the classroom. The following extract is a typical example:

The quizzes encouraged me to read the chapters in advance. The lectures have complemented and reinforced what I learned. I believe that the reading I did before coming to class helped me reinforce learning the main points during the lectures in the class (Interviewee 8, Male).

Another important feature of online quizzing stated by the participants is related to the feedback given on the answers provided to the quizzes. As the web-based tool used in this study automatically analyzed the responses provided to the quizzes, the participants received detailed direct feedback (Ellis, 2009) on their correct and incorrect responses. One of the participants valued this instant feedback saying that:

Other teachers also gave quizzes a few times throughout the semester, and sometimes it took two or three weeks just to learn our scores. But, when I finished the online quizzes, I learned not only my score but also received feedback on my responses, together with the page numbers on the course book where I can review the things that are asked (Interviewee 12, Female).

Most participants (n= 12) felt better prepared for the final examination after they completed the online quizzes. One of the participants expressed that:

The quizzes forced me to come to the class having read the materials. As I did the readings in advance, just reviewing my notes before the exam date helped me a lot on the final. I think in this way I was free of anxiety because I was prepared (Interviewee, 10, Female).

Almost all of the participants (n=14) touched upon the issue of keeping up with the course readings. Many valued pre-lecture online quizzing stating similar expressions to the following view shared by one of the participants:

Since I know that my teacher will review the important points during the lecture, I do not read the chapters in advance. However, quizzes encouraged me to read the chapters in advance. If there had been no quizzes, honestly speaking, I would not have read them. (Interviewee, 3, Female)

Regarding the use of web-based quizzing system (QuizStar), all the participants expressed that the website was easy to use and user-friendly. The comments provided on the use of the website indicated that the website had a good navigation, which is believed to be one of the most important aspects of website usability. As it included simple menus and limited number of items and it was accessible through a variety of platforms such as tablets, the participants expressed that they did not face any problems while completing the quizzes except some technical issues.

Although the qualitative findings of the study mostly provided positive perspectives of the online quizzing, several changes or problems were voiced by the participants while they were doing the quizzes. Some of the participants raised some problems categorized as technical issues. Six of the participants expressed that they sometimes had problems with the Internet connection on the quiz day and time and missed some of the quizzes. As stated in the methodology section, the quizzes were scheduled each week for specific time and day. Moreover, a 10-minute timer was enabled for each quiz in order to increase quiz security. However, determining a fixed-day and time quiz

availability appeared to be an issue for several participants having problems such as computer breakdown and internet connection lost. Several participants (n=2) expressed that some of the students helped each other while doing the online quizzes. It is well acknowledged that quiz security is a serious problem; however, there is no way to guarantee that students are not cheating. The current study applied several settings to online quizzes such as randomizing questions and time limit to maximize quiz security.

The results of the present study confirm that pre-lecture online quizzes have a positive effect on the academic performance of the participants in the experimental group. This observation supports the findings of several other studies (Galizzi, 2010; Stull et al., 2011; Kibble, 2011; McDaniel et al., 2012; Brown & Tallon, 2015), whose findings indicate that online quizzes increased students' achievement.

The current study also indicates that there is a correlation between the scores obtained on pre-lecture quizzes and the final criterion-based examinations. In other words, when the participants score higher on the quizzes given throughout the semester, they are also likely to score high on the final examinations given at the end of the semester. This finding is in alignment with that of the study conducted by Galizzi (2010), which indicates that online quizzes can be reasonable predictors of students' overall performance.

The participants were aware that the scores obtained on the quizzes might affect their overall success and the grade to be assigned at the end of the semester. Therefore, they did read the chapters in advance and completed the questions, contributing to preparation, engagement as well as participation (Brown & Tallon, 2015; Urtel et al., 2006; Arora et al., 2015). This finding suggests that many of the participants considered the quizzes seriously and were motivated to attend the classes having read the materials, which has also been confirmed by other studies conducted by Lu (2009), Dumova (2012), Dashtestani (2015), and Arora et al. (2015). Furthermore, the semi-structured interviews conducted with the participants in the experimental group proved that the participants adopted positive attitudes towards online quizzes. These quizzes were rated favorable by

the participants due to reasons, some of which were stated as prompt feedback and reinforcement of learning, which is congruent with the findings of the studies conducted by Harter and Harter (2004), Lu (2009), Arora et al. (2015), and Dashtestani (2015). The interviews also confirm that online quizzes are perceived easy to use and user-friendly, which is also confirmed by the findings of Dumova's (2012) study.

Several findings of the study were determined to be inconsistent with those of other studies. Although the current study confirmed that pre-lecture online quizzes affected student exam performance, this finding is inconsistent with the finding of the studies conducted by Harter and Harter (2004), Urtel et al. (2006), and Palocsay and Stevens (2008).

Considering the findings of the study, it might well be expressed that teachers and lecturers are advised to use online quizzes in their classes to maximize student learning. While it might be argued it takes a great amount of time for teachers and lecturers to prepare questions and the corresponding feedback for each question, it should be noted that the benefits far outnumber the negatives. Using online pre-lecture quizzes might also allow teachers to devote more time to discussing the readings at the levels, as most of the basic information in the readings will be reinforced by online quizzing. Online pre-lecture quizzing might also be an effective solution to induce many students to do the assigned readings as McDougall and Cordeiro (1993, p. 47) point out that "... many students simply do not complete assigned readings punctually or effectively in the absence of periodic verification or impending grade-contingent tasks."

Based on the quantitative and qualitative analyses conducted and the findings obtained, the following suggestions can be put forward:

1. Since quizzes taken by learners help them to learn key terms and concepts to be covered in the classroom (Nyguyen & McDaniel, 2015), online quizzes can help teachers and lecturers who are trying to motivate students to come to class having learned these terms and concepts.

2. It is acknowledged that the use of quizzes in large EFL classes and university content courses encourages students to read the chapters through quizzes (Brady, 2012). However, it might not be possible to do regular paper-based quizzing considering the number of students and the need to inform these students of their progress through providing feedback. As Carbone (1998, p. 68) indicates, "...if there are only two major tests, that is, the midterm and the final exam, with no smaller quizzes or assignments in between, then there will be only minimal opportunity for instructor[s] and students to self-assess, adjust, and learn from past mistakes." Therefore, integration of online assessment could be perceived as a potential solution to regular assessment in large classes taking some assessment practices online for better learning incentives. Online quizzes, especially multiple-choice questions, may help learners practice with extra materials and get immediate online feedback (García & Arias, 2000), and for better learning incentives (Hémard & Cushion, 2003).
3. Teachers and lecturers can create informal/formal formative quizzes to test students and monitor their progress in groups or individually. Teachers can try various Web 2.0 tools during formative assessment of their students and decide which software/tools meet(s) their students' needs to create e-learning materials as well as quizzes, some of which have been discussed in detail by Krajka (2003), Shin (2012), Kessler (2013), Blake (2013), and Žemberová (2015).
4. It is also suggested that technology contributing to language assessment be integrated into the curriculum of teacher education programs through individual courses (Çelik, 2013; Rakıcioğlu-Söylemez & Akayoğlu, 2015). Alternatively, topics on using technology in assessment can be integrated into the educational measurement and evaluation courses, in which students will also be informed on to what extent technology can be a part of language assessment not only in the classrooms but also outside the school.

Conclusion

This study investigated the extent to which language students' preparation for classes and their academic performance on the final exams were affected by pre-lecture online quizzes. The study also aimed to determine the potential merits of pre-lecture online quizzes provided to both students and teachers. The results indicated that the pre-lecture online quizzes had positively affected the achievement of the participants in the experimental group who were exposed to pre-lecture quizzes in advance of classroom discussions. Moreover, it was also determined that a significant positive correlation existed between the scores on the quizzes and the scores on the final examination. The findings also revealed that the participants adopted positive attitudes towards online quizzing since online quizzes motivated them to read the classroom materials and learn the key concepts and terms. Prompt feedback was especially valued by the participants.

The results of the current study might be valuable for teachers, and especially lecturers who wish to conduct regular testing through quizzes to motivate students to attend the classes having read the materials but fail to manage due to several reasons such as large classes and working at overloaded levels. As indicated in the study, online quizzes might be considered an effective and satisfactory solution to these issues.

Limitations and Future Research Directions

Since the study was conducted with a limited number of participants, and the format of the online quizzes was limited to multiple-choice questions, the results of the study cannot be generalized to all situations but transferrable to similar contexts. Moreover, as it was not possible to monitor students to check whether they did the online quizzes on their own and/or with others' help, further research can consider these limitations and take necessary steps to maximize quiz security. Future studies are needed to corroborate the findings of the current study with different types of questions and different types of topics to check whether these can yield different results.

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