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ONLINE QUIZZES IN IMPROVING STUDENT LEARNING

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Abstract:

Distance learning educators include self-assessment formative quizzes into the curriculum to enhance students' learning experiences. Online quizzes are a useful learning tool, particularly when courses are delivered online, thanks to technical advancements in web-based delivery. The greatest aspect of offering online quizzes is that the correct answer and any suitable comments are offered to students instantly after they complete a question. The present study evaluates students' overall performance in one of the core courses, in which self-assessment quizzes were administered through the e-learning system in order to reflect their learning behaviour towards the coursework. As part of formative assessment, it was noted that students' frequent efforts aggregated during the final exam session; yet, as soon as the quizzes were made available, a few students took them. The data demonstrated a substantial link between students who took the quizzes and their overall achievement as measured by final grades. This paper delves through the essential factors to consider when developing well-crafted quizzes for technical courses and so maximising their potential as an effective learning tool.

Keywords:

Quizzes, Distance Learners, Coursework

Introduction

It is widely assumed that Castillo-Manzano et al. (2023) and Bjælde, Boud, and Lindberg (2023) asserted that the quality of student performance in coursework is greater than that achieved in final exams (Castillo-Manzano et al. (2023). Moreover, the variation in grades between coursework and exams is greater in certain areas than others. In general, the term "examination" refers to assessment under stringent formal and invigilated time constraints, whereas the term "coursework" represents every other mode of assessment (Masuku, Jili, &

Sabela, 2021). In Malaysia, it is common to categorise assessment into coursework and examination. Coursework therefore includes the assignment, individual project, individual presentation, group work (presentation, discussion, and project), case study/analysis, quizzes, etc. (see Table 1).

Table 1: Assessment Components

Assessment	Strategic Purpose	Character of Exercises
Class quizzes	<p>Quizzes are delivered in an attempt to encourage students to review the</p> <p>previous week's work ahead of each class and to provide rapid feedback on their understanding of key ideas and basic concepts. The emphasis on basic concepts ensures that students who</p> <p>keep abreast of the course receive good marks and encouragement through this process.</p>	<p>A series 4–6 of brief 15-minute quizzes, each worth between 2% and 4%, each consisting of 2–5 questions, requiring single concept sentence answers or single-word lists in response. After each quiz, a model answer sheet is displayed, so that each student can evaluate their performance.</p>
Examination	<p>The examination provides a summative assessment for the course. However, ahead of this, prepublication of the</p> <p>source question bank aims to help students to focus on key issues raised in the course by focusing their attention on key issues.</p>	<p>A 1.5 or 2-hour essay examination, worth 30–40%, of the total marks requires students to answer two essay</p> <p>questions from four on a paper drawn from a question bank of six included in the course guide. It is intended that</p> <p>candidate examination questions should guide student independent reading through the term.</p>
Classroom presentation	<p>This exercise aims to build skills in spoken communication and some</p> <p>self-awareness of the techniques of communicating scientific understanding. The challenge is for students to convey, effectively, the</p> <p>message contained in some key technical literature in terms their</p>	<p>Students review either a self-selected topic of relevance to the course or some preselected readings or a computer routine and summarize their findings as a classroom presentation, which is supported by a short written report. These optional exercises are worth 20%.</p>

peers can comprehend and appreciate.

The talk strives to summarize the key points in the target papers and encourage students to read the work for themselves.

Source: Haigh (2007)

It is believed that, on average, students tend to have a better performance in coursework compared to formal examinations. For instance, weekly online quizzes are used as preparatory material to incentivize preparatory reading and enhance active learning among the distance learners. Supported by Fawzia and Karim (2024) and Bjælde, Boud, and Lindberg (2023), certain disciplines' assessors in various subjects have attempted to mitigate the higher scores associated with coursework by imposing relative weightings in favour of exams, which are often regarded as a more trustworthy measure of knowledge and understanding.

Students have said that quizzes inspire them to review their material before each session, in addition to enhancing their participation in the course. Class quizzes promote better involvement and assist students in striving to stay ahead of their work. Class quizzes, on the other hand, pertain to the regeneration of learned material and are positively correlated with forms of assessment requiring prompt individual knowledge, such as examinations, learning journals, and oral presentations, but not with team collaboration or inferential exploration-based assessments.

Frequently administered class quizzes may increase and sustain student interest, attendance, and learning in progressive courses. They concentrate on practical knowledge, which provides a solid basis for developing deeper understanding. Yet they are most likely not the ideal technique to test deep learning (MacKenzie, 2023). Weekly class quizzes are an effective form of formative assessment and an essential component of any broad-based assessment plan. As a result, since they foster early memorisation, class quizzes are an excellent platform for deep learning.

As a result, the purpose of this research is to determine whether students often obtain better grades in coursework than in exams. If this conclusion is accurate, the common amount of mark discrepancies and whether this difference fluctuates across disciplines should be established. Furthermore, the importance of the disparities for fairness in student assessment treatment and how assessors adapt to the impacts in their assessment procedures must be investigated.

This research investigates the function of online quizzes in improving student learning. The research examines the consequences of a weekly class quiz in advanced-level undergraduate courses at a Malaysian public university. The impacts are examined both qualitatively and quantitatively, depending on the students' responses, i.e., whether they believe the online quizzes aided their learning, and on the association between quiz marks and other forms of assessment. Moreover, the method's gender equality is investigated, as is the average grade.

This study therefore poses the following research questions:

1. Does the performance of online quizzes determine the overall student coursework marks?
2. Does the performance of online quizzes determine the overall student coursework marks by gender?
3. Does the average score of online quizzes determine the overall student coursework marks?

Literature Review

Formats of Questions in Online Quizzes

According to Nguyen and McDaniel (2015), for blended and e-learning, students' self-assessment through quizzes, especially using a closed-question style, is a highly popular technique of delivering study materials. Closed questions are made up of a stem that contains a question, a statement, or a case example. Possible responses, called "items," are presented below the question in the form of numerous sentences (Yu & Chen, 2021). Students will analyse each statement and choose the accurate answers, such as by selecting a checkbox. In general, closed-question formats range in the number of items provided (Yu & Chen, 2021); the most common format is single choice, in which only one of at least three answers is valid. Alternate choice, on the other hand, is a subset of a single-choice question with just two options; in the multiple-choice style, more than one of n items may be correct. Students must evaluate the truth of a statement based on its stem by selecting a binary decision in the true-false style ("correct" vs. "incorrect"). The closed-question format is an extremely effective and objective method. University lecturers may reduce correction time and perform self-assessment for large student groups by using computerised assessments (e.g., Lindner et al., 2015). Students may work independently according to their schedules and receive feedback on their learning progress via formative assessments throughout the semester. Yet, there are several options for designing exams and quizzes (e.g., single-, alternate-, or multiple-choice formats) and implementing and enriching them in computer-based environments (Lindner et al., 2015). As a result, instructors consider how to incorporate closed-question testing into their lectures and seminars so that their students gain the most. While existing feedback research discusses the efficacy of different feedback situations, the ecological validity of equivalent instructional designs has not been rigorously verified in naturalistic online learning contexts.

According to Nguyen and McDaniel (2015), online quizzes are useful learning aids as formative assessments, particularly for learners who study independently, since they offer immediate feedback on the students' progress in mastering essential topics. Can formative assessments increase students' overall performance in summative assessments, when students must demonstrate their knowledge via assignments and exams? Students who chose to do online quizzes were reported to have better performance in summative examinations (Lu & Cutumisu, 2022). Nevertheless, Hughes, Salamonson and Metcalfe (2020) demonstrated no link between performance in formative quizzes and subsequent performance on summative assessments for inexperienced biology students; notwithstanding, Peat et al. (2005) noted an advantageous impact being established later in the programme.

Methodology

Online Quizzes

A weekly online assessment (quiz) was created and incorporated into an existing course of an undergraduate management programme which is JTP393E International Business at the School of Distance Education, Universiti Sains Malaysia. This core paper has a total of 519 enrolled students. Instruction was given to the students by inviting them to participate in the quiz, which would be opened just after the WebEx class finished (see Figure 1). Students would be rewarded a badge for their participation.

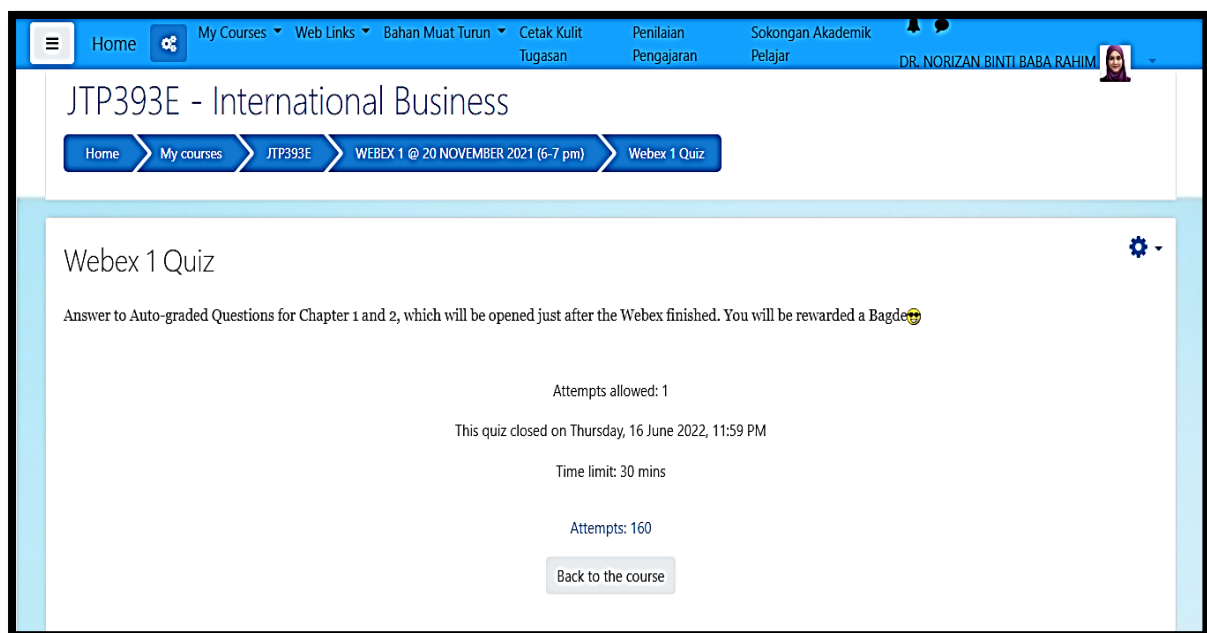


Figure 1. Screenshots of Instructions for Students to Participate In The Quiz And Be Rewarded A Badge

The online quizzes were constructed with 10 true or false questions (see Figure 2). The objective was to evaluate student learning abilities at three cognitive levels: recall (remembering specific facts, terms, principles, or theories); application (using knowledge to solve a problem or analyse a situation); and evaluation (exercising informed judgment). Moreover, the questions were simple enough that students who had completed the reading and were engaged with the essential topics could finish the quiz faster to earn a better score.

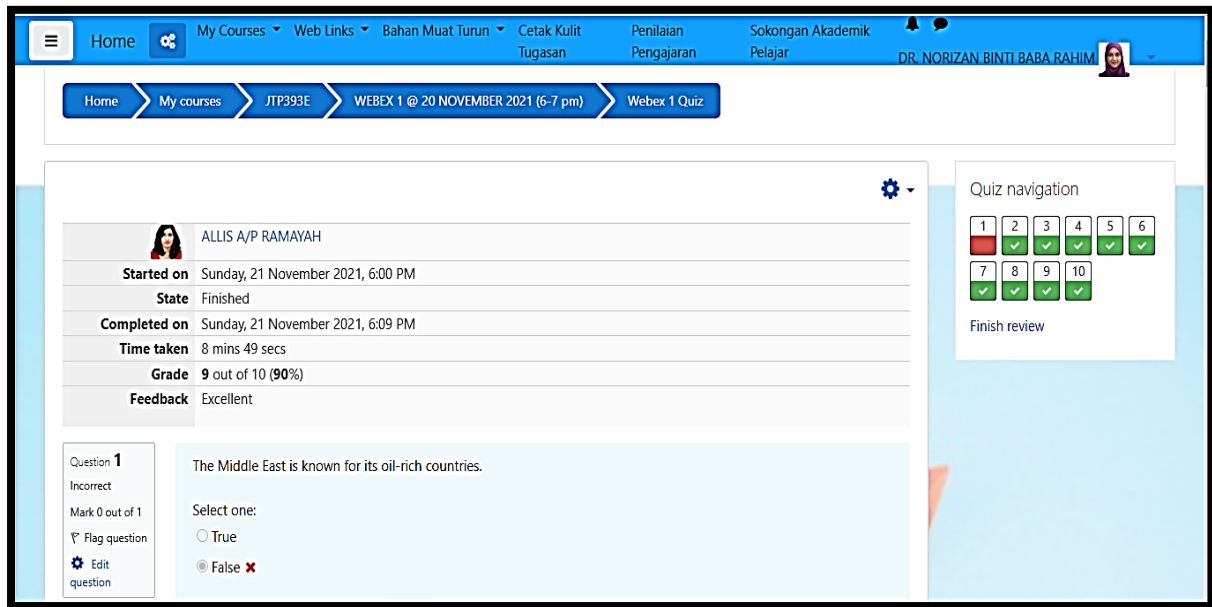


Figure 2. Screenshots of Instructions for True or False Questions Used in The Quiz

The lecturer would share the student scores in the portal. It detailed the student’s attempts in terms of state, time started on and completed, time taken, and the total grade of 10 earned by each student (see Figure 3).

Surname	First name	ID number	Email address	Institution	State	Started on	Completed	Time taken	Grade/10	Q. 1	Q. 2	Q. 3	Q. 4	Q. 5	Q. 6	Q. 7	Q. 8	Q. 9	Q. 10	
	NUR FAATIHAH BINTI AHMAD	920323086016	faatihahahmad@student.usm.my	93602	Finished	20 November 2021 7:01 PM	20 November 2021 7:20 PM	19 mins 56 secs	8	0	1	1	1	1	1	1	1	1	1	0
	MANISHA A/P NARAYANASAMY PILLAI	991102025402	sha021199@student.usm.my		Finished	20 November 2021 7:01 PM	20 November 2021 7:15 PM	14 mins 25 secs	5	0	1	0	1	1	1	1	0	0	0	0
	NUR FARIHA BINTI MOHD ROZLAN	930916075864	nurfariha@student.usm.my	93607	Finished	20 November 2021 7:01 PM	20 November 2021 7:21 PM	20 mins 12 secs	10	1	1	1	1	1	1	1	1	1	1	1
	NURSUHADA BINTI MOHD RASID	880505025624	nursuhada@student.usm.my	93659	Finished	20 November 2021 7:01 PM	20 November 2021 7:04 PM	2 mins 27 secs	6	0	1	1	1	0	1	1	1	0	0	0
	NURUL AMALINA BINTI SHAHAR	901029025972	nurulamalina90@student.usm.my	93661	Finished	20 November 2021 7:06 PM	20 November 2021 7:08 PM	2 mins 14 secs	7	0	1	1	1	1	1	0	1	0	1	1

Figure 3. Screenshots of The Student Score for Quiz 1

Answers for the quizzes were discussed in the next class meeting, and students were rewarded a badge for their participation in every set of quizzes they have attempted (see Figure 4).

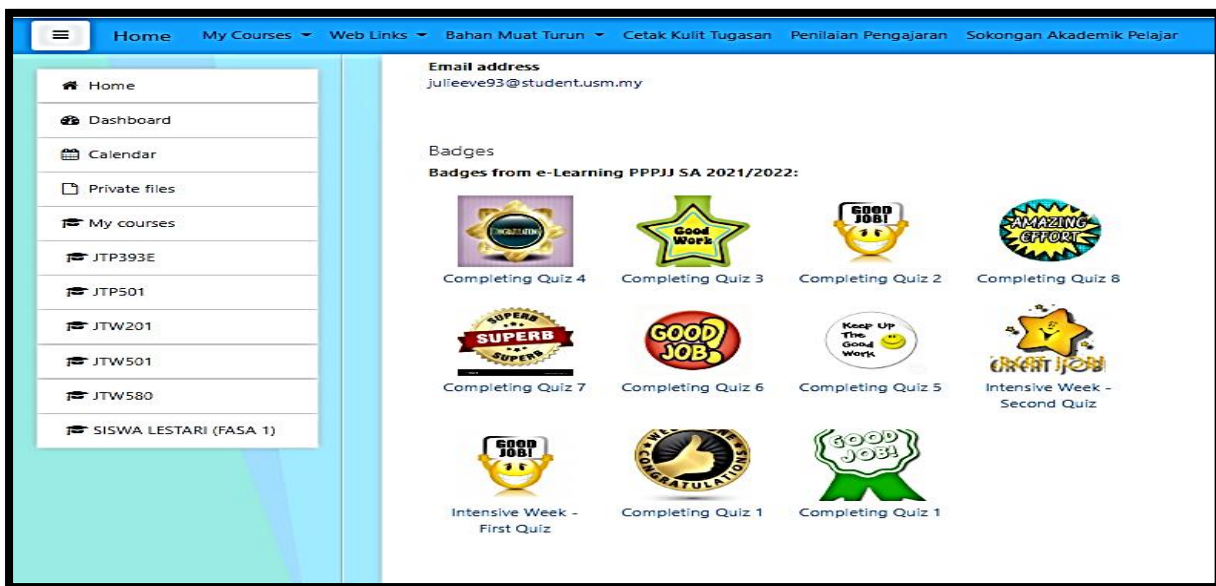


Figure 4. Screenshots of Students' Earning Badges for Completing Every Quiz in The Course

Results

In order to get the results of the quizzes, reports were generated through the e-learning portal for the course of JTP393E International Business offered in the 2020–2021 academic session. There were 519 students in this course. The data reported indicates that among the 10 quizzes released progressively, the percentage of quizzes attempted is between the range of 17 percent ($n = 90$) and 37 percent ($n = 191$). Table 2 presents the variation in the quiz attempts of the students.

Table 2: Variance in The Proportion of Students Who Attempted Quizzes

Set of Quizzes	Overall Quiz Performance		
	Total Students	Total Attempts	% Attempts
Quiz 1 (before Intensive Week)	519	159	31%
Quiz 2 (before Intensive Week)	519	191	37%
Quiz 3 (before Intensive Week)	519	118	23%
Quiz 4 (before Intensive Week)	519	160	31%
Quiz during Intensive Week 1	519	189	36%
Quiz during Intensive Week 2	519	175	34%
Quiz 5 (after Intensive Week)	519	92	18%
Quiz 6 (after Intensive Week)	519	101	19%
Quiz 7 (after Intensive Week)	519	90	17%
Quiz 8 (after Intensive Week)	519	128	25%

Quiz 2 (before intensive week) had the highest number of students who attempted ($n = 191$). The lowest student attempt ($n = 90$) is in Quiz 7, after Intensive Week 1 (17%). Figure 5 illustrates the percentage for the number of quizzes attempted.

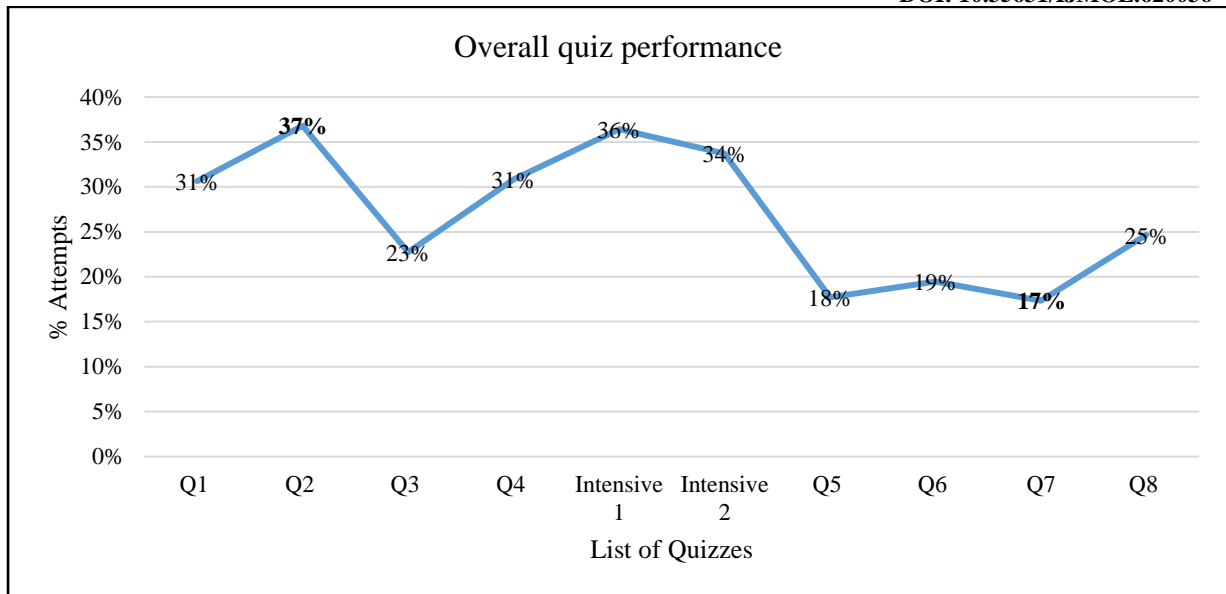


Figure 5: Overall Quiz Performance

The data reported that, among the 10 quizzes released progressively, the percentage of quizzes attempted by female students is between the range of 62.96 and 77.34 percent (see Table 2). The summary of the variation in students' quiz attempts by gender is shown in Table 3.

Table 3: Gender Variances in The Proportion of Students That Attempted Quizzes

Set of Quizzes	% Male Attempts	% Female Attempts
Quiz 1 (before Intensive Week)	30.82	69.18
Quiz 2 (before Intensive Week)	32.98	67.02
Quiz 3 (before Intensive Week)	35.59	64.41
Quiz 4 (before Intensive Week)	33.75	66.25
Quiz during Intensive Week 1	37.04	62.96
Quiz during Intensive Week 2	33.14	66.86
Quiz 5 (after Intensive Week)	26.09	73.91
Quiz 6 (after Intensive Week)	27.72	72.28
Quiz 7 (after Intensive Week)	28.89	71.11
Quiz 8 (after Intensive Week)	22.66	77.34

The highest score attempted by a female student is in Quiz 8 (after Intensive Week) (77.34%). The lowest score by a female student is in Quiz (during Intensive Week) (62.96%). The percentage of the number of quizzes attempted by gender is depicted in Figure 6.

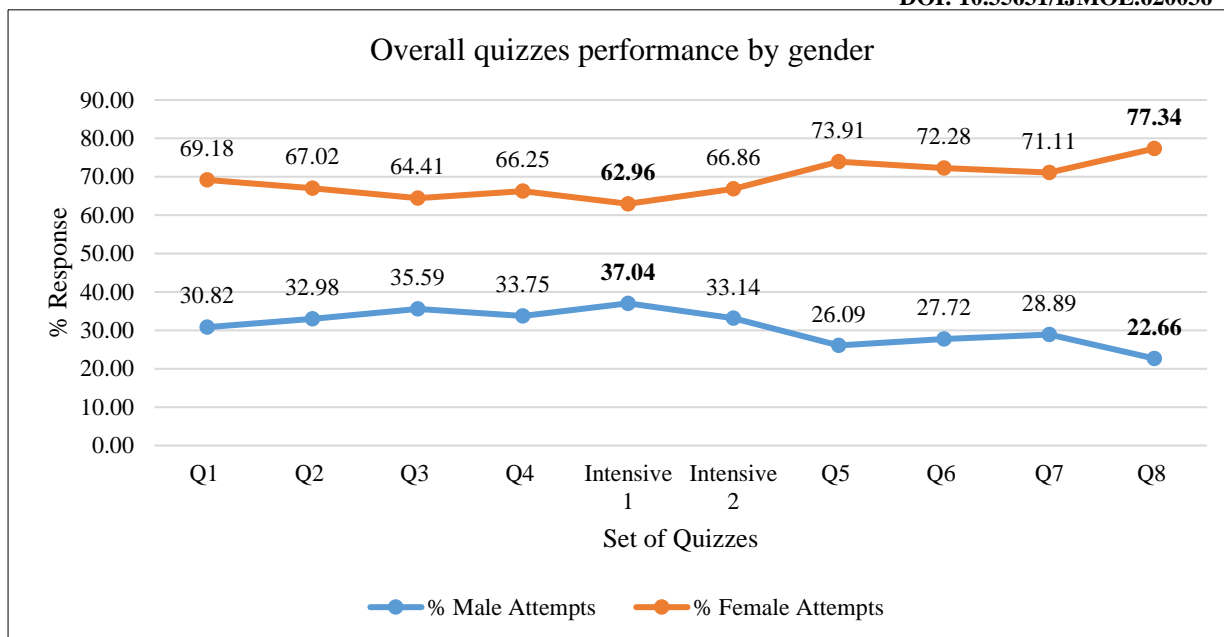


Figure 6: Overall Quiz Performance By Gender

The data reported that among the 10 quizzes released progressively, the average score of students who attempted the quizzes was for quiz 1 (during Intensive Weeks 1 and 2) and for quiz 5, which was after Intensive Week. The score was 9 over 10. Table 4 shows the summary of the variation in students' quiz attempts by average score.

Table 4: Variance In The Proportion Of Students That Attempted Quizzes Based On Their Average Score

Set of Quizzes	Average Score/10
Quiz 1 (before Intensive Week)	8
Quiz 2 (before Intensive Week)	7
Quiz 3 (before Intensive Week)	7
Quiz 4 (before Intensive Week)	6
Quiz during Intensive Week 1	9
Quiz during Intensive Week 2	9
Quiz 5 (after Intensive Week)	9
Quiz 6 (after Intensive Week)	8
Quiz 7 (after Intensive Week)	7
Quiz 8 (after Intensive Week)	8

The highest average score by students' attempts is 9 over 10. The percentage of the number of quizzes attempted by average score is displayed in Figure 7.

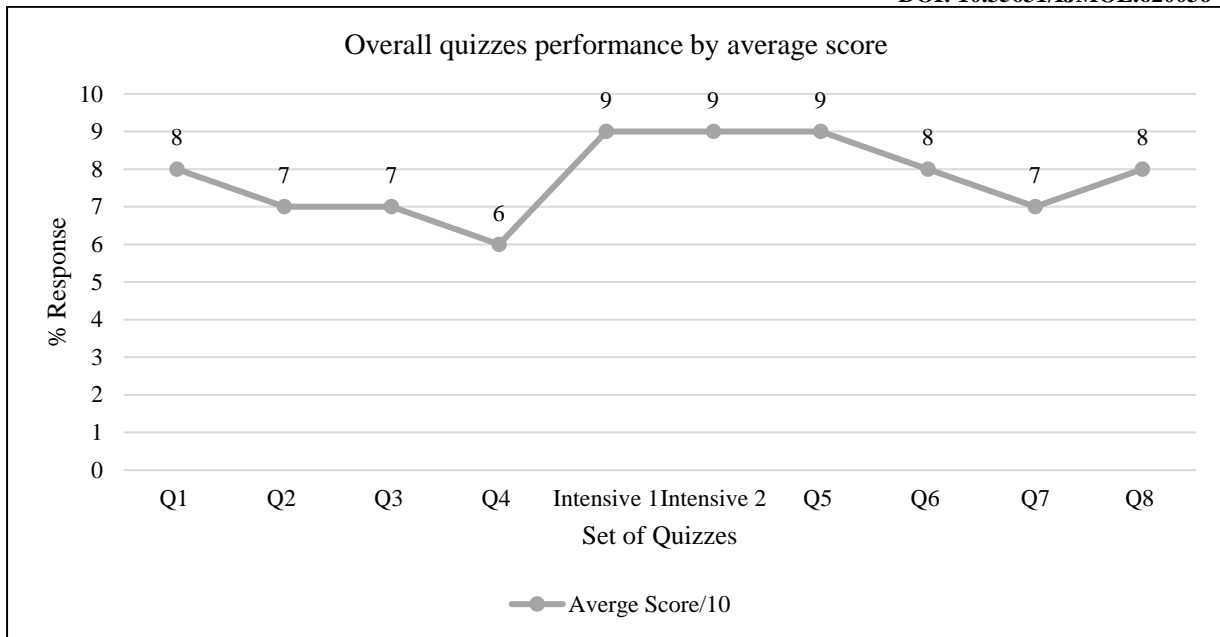


Figure 7: Overall Quiz Performance by Average Score

Discussion

Quizzes were created and disseminated using online learning management systems to provide additional assistance for learners who study independently and to increase their interaction and engagement. Nevertheless, more than 60% of JTP393E International Business course students did not attempt the quizzes.

The results indicate that the students' performance on online quizzes determines their overall coursework marks; their performance on online quizzes determines their overall coursework marks by gender; and lastly, the average score of online quizzes determines their overall coursework marks.

According to Lu and Cutumisu (2022) and Juhaňák et al. (2019), student engagement in formative assessment is minimal; hence, an incentive such as course credit ranging from 0.5% to 2.0% for every quiz would have resulted in a significant increase in participation. Furthermore, feedback from students reinforces this notion. Nevertheless, although there are benefits to establishing summative quizzes and rewarding students for routinely attempting the quizzes in their total marks, there are a few obstacles to practising this, especially in a flexible educational setting where 80% of learner's study through the external mode.

Lu and Cutumisu (2022), stated that the main barrier to implementing summative quizzes is that they must be timed to ensure students complete them seriously without cheating, particularly among on-campus students who are able to cooperate with each other. Yet, this limits the flexibility of studying for non-resident students (e.g., part-timers) who have employment and family responsibilities. When quizzes have a flexible deadline to be completed, the questions must be taken from a bank of questions; therefore, the opportunity to cheat is reduced. Since quizzes like this take time to develop, the resource implications for the lecturers involved need serious consideration. Additionally, it is reasonable to assume that

students studying externally from locations have limited access to the internet, which must be given consideration too

The researchers also revealed that learners used a strategic approach to studying rather than a deep approach to learning. Students preferred quizzes that immediately fed into examinations and coursework tasks, such as JTP393E, and quizzes from modules where they could readily understand the fundamentals. Rather than allowing students to answer multiple-choice questions set by instructors to increase their deep comprehension of some modules' essential topics, it is conceivable to enable students to take quizzes that will have more advantages for student engagement (Rudansky-Kloppers et al., 2014; Singh & Gokool, 2018).

Paul et al. (2008) developed PeerWise, which that can be tested to determine how it promotes learning. In JTP393E, ten quizzes were picked from a pool of over 100 questions; consequently, the aforementioned technique may be tested over the subsequent years, culminating in a database of questions suitable for a summative assessment. Besides, for JTP393E, some students attempted the quizzes later in the semester. For example, 75% of individuals who received a B+ and took every quiz did so in the final week before the examination session. The quizzes in this course are designed to help students understand the fundamental topics and are not meant to mimic exam questions. As a result, it is critical to encourage students throughout the semester to take the quizzes early in order to get the most out of them. Yet, as the quizzes in JTP393E emulate the MCQ part, even last-minute endeavours may provide a better result.

Conclusion

The researcher attempted to establish a trend of distance learners' learning behaviour toward coursework. One course was chosen, and quizzes with varied aims were evaluated. This course had ten tests that addressed each topic taught in the course. Several conclusions can be drawn from this study. First, Peat et al. (2005) discovered a link between achieving a better overall grade and taking extra quizzes in JTP393E. Second, in JTP393E, the relationship was weak between overall performance and quizzes attempted. Despite these challenges, there was a positive correlation between completing the quizzes and performing well on the true/false component of the examination. Finally, in general, students who completed the quizzes attempted them more than once, and in JTP393E, the attempt frequency was as high as three times for specific quizzes. Moreover, indicators of selective learning of course topics were discovered. Implementing such quizzes as part of the summative assessment necessitates extra planning based on the overall course objectives and assessment method.

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