

# The Impact of Quizzing on Student Engagement in Online Learning

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**Abstract:- Online learning is highly promoted within higher education institutions in order to assist in teaching and learning activities. Adoption of an online Learning Management System (LMS) is significantly vital, in particular, during the period of pandemic situations like COVID-19 for students to engage in learning. The identification and implementation of appropriate strategies are very useful to motivate students to engage in learning through online platforms. There seems to be a range of teaching materials available with LMS, and as an assessment and teaching tool, quizzes are very effective among these. Although previous studies have revealed quizzing as an effective tool for motivating students, there is less scope to research the effectiveness of quizzing on online learning engagement among students. Hence, the current research focuses primarily on determining how quizzes create an impact on student participation in online learning. This research is based on 864 first-year students' LMS login data to access interactions between the students and the course materials. It has been revealed that the effect of quizzing on student engagement in completing prescribed reading is strong. Quizzes have also been found to be a successful tool for encouraging students to complete preparatory work and to promote active learning.**

**Keywords:-** *Quizzing, Engagement, Online Learning, LMS, COVID-19.*

## I. INTRODUCTION

Learning through online platforms is highly increased within higher education institutions to assist in teaching and learning activities. Although a large number of institutions have adopted the Learning Management System (LMS), teachers and students are not very familiar due to numerous reasons. However, the use of these tools came significantly upfront during the time of COVID-19's pandemic situation where the learner could not physically contact the instructor. Many institutions of higher education have to include learning through online platforms to allow students to continue their education without interruption. Student engagement requires learners to be actively involved in all stages of the learning process. The concept of student engagement has been defined in different ways and is often indirect rather than obviously defined in research studies [1][2][3]. Many researchers identify student engagement as a multidimensional construct that includes different types of engagement. According to Bond, M. et al [4], "Student engagement is the energy and effort that students employ within their learning community, observable via any number of behavioral, cognitive or affective indicators across a continuum".

Teachers who are motivated by the need to involve their students are less curriculum oriented and more focused on teaching students how to gather knowledge that helps them solve problems [5]. Thus, instead of remaining passive and waiting for the teacher to pour wisdom into his or her head, the learner takes responsibility for his or her learning. More recent research explored the conceptualization of student participation and the belief that it leads to better learning and teaching as well as student achievement [3]. Quality engagement also leads to an increased capacity for the analysis, synthesis, and evaluation of new material [6]. As a result of technology integration like LMS in higher education institutions, new student engagement strategies were brought into practice. Online course materials began appearing in various academic institutions around both developed and developing countries. LMS is becoming more popular in institutions of higher education, meaning LMS log data is an important source of information on student engagement in learning [7]. These systems keep records of summative and real-time data about student interactions with the system as compared to conventional learning environments. According to Bowen [8], to engage their students more actively, teachers need to use learning strategies like cooperative learning, continuous feedback, and writing across the curriculum. Moodle which is also a popular online learning platform facilitates teachers to create an effective virtual learning environment like LMS. There is a range of useful learning resources and activities along with the Moodle including quizzes.

Online quizzes are an essential part of e-learning that provide the students with prompt feedback while providing them the feedback on upgrading areas. In contrast to conventional in-class quizzing, online quizzing is an attractive way of teaching, because it can be graded and recorded automatically, providing instant feedback for students and it gives more time for planning and grading [9]. Early research based on teaching and learning revealed the pedagogical significance of quizzing in several fields. In previous studies, it is proposed that planned quizzes are correlated with several outcomes, such as enhanced comprehension of the assigned reading material [10], higher test performance [11], and better attendance in class [12]. Research that has been carried out on quizzing effectiveness to engage students in online learning, however, is not enough. As a useful tool, therefore, quizzes can be used to enhance student interest in learning through online platforms may be an important pedagogical-oriented problem in the e-learning field. To answer this question, in this paper the author systematically and empirically assesses the impact of quizzing on student engagement with the online learning context.

**II. LITERATURE REVIEW**

Recent pedagogical research has explored the relationship between quizzing and the involvement of students in different aspects. Rather significant theoretical contributions, as well as empirical studies, were found during the analysis of current literature. Researchers including Anderson [13], Burns and Vinchur [14], Connor-Greene [15] and Hagen [16] conducted research on different aspects of quizzes in higher education institutions. These researchers, more generally, argue that quizzes have a significant impact on student engagement and also students’ perception toward learning. For example, Connor-Greene [15] found that quizzes lead to an increase in the number of times students engage outside the classroom in reading course materials. He further noted that the self-motivations of students towards learning will be enhanced by this. In addition, by asking questions and communicating students aim to pursue knowledge and spend time more in the classroom as well. [17].

Recent developments in web-based content delivery have facilitated the implementation of a regular, out-of-class quizzing regime for teachers who are reluctant to use class time to administer and review quizzes. [11]. In two recent studies, students reported that online quizzing motivated them to read prior to class and prepared them for class discussion [18] [19]. In the research findings of Urtel et al. [18], students reported that online quizzing helped them to learn course material better. In addition, Marcell’s [19] results indicate that classes that were required to complete online review quizzes asked more reading-related questions during classes and made more reading-related comments. In addition, questions and comments from the students focused on clarifying and applying the reading material. This allows teachers the ability to expand their analysis of course content and explore the practical applications of concepts when students already understand the concepts themselves. DeSouza and Fleming [11] observed that when faced with exams, students who answered online quizzes performed better than students who solved quizzes in class. Cluskey et al. [9] found that students who complete online quizzes prior to the class participate in lessons more actively than students who do not complete online quizzes.

The use of online quizzes has been shown to inspire students to complete assigned lectures, increase participation in class discussion, and enhance performance on exams on which material has presented on the quizzes as well as in class [20]. The same study found that the students who had completed a lot of online quizzes scored more when compared to the students who had not taken these quizzes seriously. And it was highlighted that the grades and marks were higher of those who had done more online quizzes. However, there is an empirical research gap with a quantitative approach to evaluate the impact of quizzing on student engagement with emerging countries, especially in Sri Lanka, in online learning.

**III. METHODOLOGY**

The analysis was carried out using LMS login data of 864 first-year students who were enrolled with a compulsory course unit for Information Technology. These students who

came from different areas in the country got registered in the Faculty of Humanities and Social Sciences at the University of Sri Jayewardenepura, Sri Lanka. Due to the Covid-19 pandemic, they were unable to engage in learning at the university physically. With the guidance of the faculty, they were asked and guided to enroll in the Information Technology course unit which is compulsory to all. During the period from 26.04.2020 to 23.05.2020, reading notes with PDF format and quizzes were mainly used as teaching and learning materials in this course unit. Reading materials related to three lessons were uploaded to LMS and three quizzes corresponding to each lesson were conducted as course materials during the period. The quizzes were taken after completing assigned readings from relevant respective lessons. Records regarding the completion of each course material were generated automatically and daily aggregated counts were considered in this study. LMS user login data set was cleaned and organized by using Microsoft Excel and R. In addition to that, analysis including calculation of counts and percentages, construction of graphs, and correlation analysis was carried out using Microsoft Excel and SPSS.

**IV. DATA ANALYSIS AND DISCUSSION**

Data analysis was mainly carried out in three phases namely data cleaning and organizing, data visualization, and frequency and correlation analysis. Under data visualization, three graphs were mainly constructed based on monthly aggregated completion counts. In each graph, the green color line shows the behavior of completion counts related to reading materials given in the English medium while the orange color line shows the behavior of completion counts related to reading materials given in the Sinhala medium. The line with blue color represents how student engagement in the corresponding quiz behaves during the period. The first graph in figure 1 shows the student engagement of reading materials and quiz related to the first lesson.

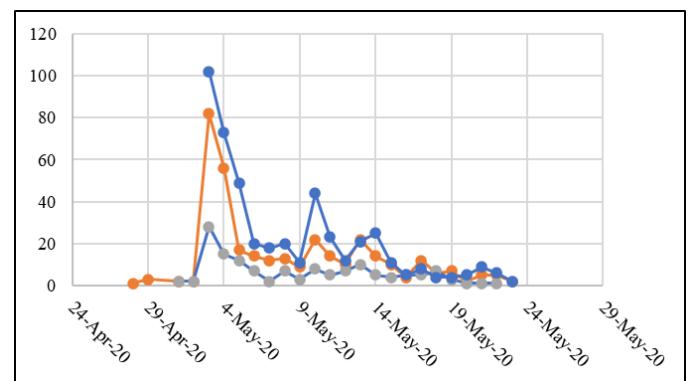


Fig 1: Student Engagement of Course Materials in First Lesson

It clearly shows in figure 1 that the highest point of each line is in the same time frame. Likewise, the second-highest point of each line is in the same time frame. These visualizations express that student engagement in reading material of lesson one has significantly increased because of the first quiz. The behavior of each activity shows very similar manners during the given period of time. This may be an indication of the impact of quizzes on involving reading materials.

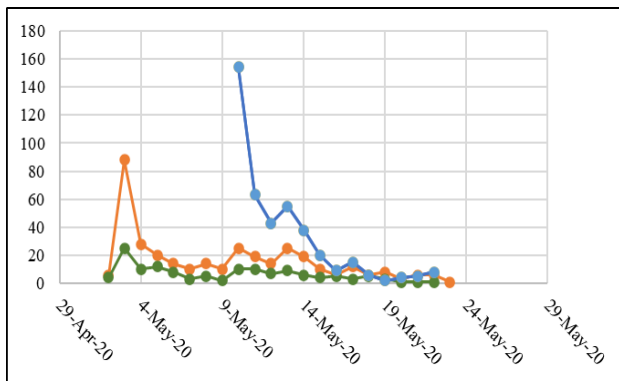


Fig. 2: Student Engagement of Course Materials in Second Lesson

The graph in figure 2 explores the student engagement of reading material and quiz related to the second lesson. In this figure, the second-highest points of two lines related to reading materials and the highest point of the line related to the second quiz are in the same time frame. Due to further examination of data, it is shown that the highest points of lines related to reading materials are in the same time frame with the highest point of the line related to the first quiz. These graphs visualize how quizzes influence student engagement with reading material in a notable way.

The graph in figure 3 shows the patterns of student engagement of reading materials and quizzes related to the third lesson. As per the figure, the second-highest points of two lines related to reading materials and the highest point of the line related to the third quiz are in the same time frame. As a result of further examination of data, it is revealed that the highest points of lines related to reading materials are in the same time frame with the highest point of the line related to the second quiz.

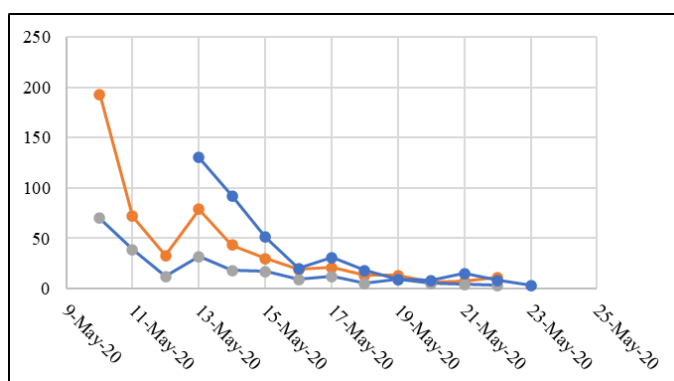


Fig. 3: Student Engagement of Course Materials in Third Lesson

Since these three graphs show some kind of similar patterns regarding course materials, there might be significant correlations needed to be measured. Calculated correlation coefficients with their corresponding p-values are organized in table 1.

| Reading Material   | Quiz 1        | Quiz Q2       | Quiz Q3       |
|--------------------|---------------|---------------|---------------|
| Lesson 1 (Sinhala) | <b>0.982*</b> | 0.826*        | 0.938*        |
| Lesson 1 (English) | <b>0.826*</b> | 0.616*        | 0.756*        |
| Lesson 2 (Sinhala) |               | <b>0.831*</b> | 0.961*        |
| Lesson 2 (English) |               | <b>0.797*</b> | 0.852*        |
| Lesson 3 (Sinhala) |               |               | <b>0.976*</b> |
| Lesson 3 (English) |               |               | <b>0.949*</b> |

Table 1: Correlation Analysis of Students Engagement of Course Materials

All the correlation coefficients are statistically significant at the significance level of 5%. These correlation coefficients exhibit positive correlations between each course material. Each reading material and corresponding quiz show the strongest correlation compared to other course materials. Therefore, conducting quizzes relevant to the same lesson motivated students to refer to reading materials given. In a general sense, it is clear that these correlation coefficients in addition to three figures express that there is a notable influence of conducting quizzes on student engagement with reviewing reading materials. Furthermore, counts and percentages related to engagement with course materials were organized in table 2. The bold values describe the degrees of changes occurring in student engagement due to quizzes.

There were only 02 students reviewing reading materials in the Sinhala medium before giving the first quiz. This has increased to 82 because of the first quiz. The resulting change in is a huge upsurge. Likewise, there were only 02 students reviewed reading materials in the English medium before giving the first quiz. This has increased to 28 because of the first quiz. Related to other two quizzes, there is also a clearly indication of improvement of engagement due to quizzing. Although it shows a positive improvement regarding student engagement with quizzes, corresponding values are not much higher as of the first quiz. This revealed an interesting fact that students were involved in reviewing reading materials due to the first quiz and the effect of that remains the same for some time. In this respect, utilizing a technique such as quizzing is very useful to keep students engaged with learning through platforms such as LMS.

V. CONCLUSION AND RECOMMENDATIONS

Generally, the results of this study support quizzing as a learning tool, particularly since it motivates students to engage in online learning. The findings of similar studies on the positive effect of quizzing on student engagement are supported by the results of this study.

The findings of the research study both support and reinforce past research findings, as it is shown quantitatively and visually that quizzing increases student engagement in online learning, especially in a pandemic situation such as COVID-2019. One limitation of our study, though, was that it took place over the pandemic situation in COVID-2019, so that not all students could be surveyed. In the future, replicating this study with a larger sample size would be useful

to see if similar results will be obtained after the pandemic situation is settled.

This will provide many chances to observe the effect of the online quizzes on student interaction comprehension. Based on the results, quizzing can be an effective time- and resource-efficient learning tool for enhancing student engagement in learning through online platforms. The study provides a high degree of student engagement as a result of conducting quizzes to complete prescribed reading. Quizzes have thus been found to be a successful tool to inspire students to complete preparatory work and enhance active learning through online platforms. From the teacher's point of view, online quizzes were also comparatively time effective. It can be suggested that quizzing can be used to facilitate online teaching and learning without significant expenditure by the staff including the instructor as well as the student in terms of time and financial resources.

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