

Development and Evaluation of an Online Gamified Assessment Environment

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Abstract— In the field of education, gamification is expected to be one of essential elements that can enhance student's engagement typically in a distance learning environment. It has the potential role to improve the quality of learning by better engaging students with learning activities. Providing opportunities to engage student's learning in a way of a new technology. Gamification is one of the new-technology essential for engaging and motivating students to learn, this is defined as “the use of game-design elements in non-game contexts”.

According the literature there are several studies that prove positive correlation between gamification and student engagement to improve teaching process. This research aims to evaluate the effects of gamified online assessment on student's engagement to improve learning process especially during distance learning. Students through distance learning encounter several challenges, thus the effectiveness of gamification on them is still questionable. In this research a web-based tool was developed for gamified online assessment to measure the effectiveness of gamification environment on students' assessment performance.

To express this, a web page was developed with an attractive user interface so that can easily understand the problem by end users. Tools that used to create Web Pages in CSS, HTML, PHP, Java scripts and as a backend used SQLite with other technologies of WWW (world wide web), for drawing of the graphic and text contents. While looked code of web page consistently like as webpage design.

The design has become a critical element required to engage students in gamified environment for online assessment and game elements which used includes (Level up, Virtual coin, Time, Hints, and Progress bar). According to analysis data in this study results illustrate that high average of students accessed into the gamified learning activity like gamified online quiz as a formative assessment, the finding result showed that students are recorded as highly accessed with gamification environment to complete the quiz and engage them to answer all question independently.

Meanwhile students mentioned that playing with gamified online quiz have a great role to improves learning performance and it helped them to achieve better grades and obtained good results. Also, the finding results showed that student were very interested in participating in gamified online assessments and they enjoyed learning new skills and using gamified environment was enjoyable.

Index Terms— Engagement, Gamified Environment, and Online Assessment

I. INTRODUCTION

With the development of computer and network technology, the dissemination of knowledge has grown. The education industry has taken advantage of this trend by incorporating new technologies such as online assessment, virtual collaboration, sharing information, mobile learning apps and other technology-enhanced learning programs. Higher education institutions are increasingly using blended learning and flipped classrooms as a result of Web 2.0 and internet technology (Hasan et al., 2019). Due to the expansion and popularity of the Internet and information communication technologies, people can now share their experiences and hold discussions without being restricted by their physical locations (Lee, 2018; Parks-Stamm et al., 2017).

Online learning has gained demand as a way to enable more flexible access to resources and teaching at any time and from any location. As a result of the emergence of online learning, people's learning methods have been evolved. In contrast to traditional classroom learning, online learning takes place in a network setting. The Internet provides flexibility, mobility and ease in terms of information collecting, storage, delivery and sharing.

Recently various learning strategy provided to support online teaching and blending learning the most popular one is gamified learning strategy. Gamification has received more attention and interest in research and education in the previous several years. It is currently present in our daily lives, though we may be unaware of it at times.

Due to its influence on student's learning, gamification has been a growing trend in education (Göksün & Gürsoy, 2019). Gamification is an educational strategy to enable learning, encourages motivation and engagement, increases learner course interaction and participation, and stimulates learners so that their knowledge has will be expanded (Göksün & Gürsoy 2019; McGonigal, 2011; Lopez & Tucker, 2019). For this reason, several studies have explored how gamification can positively influence student learning and improve it.

Gamification has the advantage of making learning enjoyable through friendly competitions, rewards and challenges, these give them an effective tool for increasing students' engagement in learning (Hamari et al., 2016). It helps a student to develop multitasking and critical thinking skills (Ding et al., 2018). Moreover, in regards to student learning gamification provides a data source, guaranteeing teachers, administrators, parents to have access to more effective, precise and timely information (Zainuddin, 2018). Meanwhile (Vanduhe et al., 2020) indicated that the advantages of gamification are numerous including flexibility, introduction of critical thinking skills and achievement of desirable result, which are all considered as the mechanism that drives participation, motivation, collaboration and engagement.

Gamification also refer to the use of elements such as scores, level up, badges, progress bar, rankings and awards to provide instant feedback. While gamification motivate students to engage in the learning environment and enables them to accomplish tasks, it is also possible to monitor and assess successful learning during the gamification process and provide feedback on the assessment to students for formative purposes. Concerning individuals' learning processes, the use of gamification as a formative assessment tool allows the teacher to obtain initial information (Göksün & Gürsoy, 2019).

Similarly, the use of gamification for evaluation highlights the benefits and drawbacks of game design. Meanwhile the assessment of student's gamification it's a powerful tool to be used (Huang et al, 2018). However, only a few research have looked into how gamification might be used to measure formative assessment in student learning (Ismail et al., 2019; Zhang & Fang, 2019). Hence, there is knowledge gap in the literature in terms of the impact of adopting gamification for online assessment, The purpose of this research is to investigate the effect gamified learning activity on student's engagement and learning performance in a formative assessment context for MCQ question type. Therefore, in this study web-based tool is developed to create gamified online assessment environment with game elements such as virtual coin, level up, progress bar and hit.

II. STUDENT ENGAGEMENT IN GAMIFIED ENVIRONMENT

The study of student engagement is becoming increasingly popular, at all levels of education, it is theorized and the topic of extensive research, but it appears to be significantly more relevant in higher education. Despite the literature's inconsistency in its definitions, the psychological investment and behavioral involvement of students in learning activities can be defined as student engagement (Appleton et al., 2008). Meanwhile the Handbook of Student Engagement Research defined engagement as a student's educational goals with learning and active participation in school-related activities (Christenson et al., 2012). Student engagement refers to the cognitive process, active participation and emotional involvement of students in specific learning activities.

According to the literature, engagement there are three different categories which includes behavioral engagement, cognitive and affective elements (Fredricks et al., 2016; Henrie et al., 2015). Cognitive engagement refers to student's effort in

learning, such as self-control, learning goals and ability to implement strategies. Behavioral engagement indicate to attendance, involvement and coursework completion are examples of visible behaviors that lead to academic success (Fredricks et al., 2016) Emotional engagement refers to the investment and emotional reactions of students to the learning process, such as their interest, identification and positive attitudes or values.

Engagement, despite the fact that it is not as new as gamification, it is still the subject of more debate (Rivera & Garden, 2021). To improve student's engagement in learning activities gamification has raised a lot of interest and development in higher education institutions. The level of student engagement in online learning is a crucial measure of online learning effectiveness, and it is an important part of studying students' learning processes (Hu & Li, 2017).

Studies focus on student engagement and Landers used an example that described student engagement as a target attitude (conflated with fun) changeable through gamification with the ability to moderate the link between instructional content and learning outcomes (Landers 2014).

To enhance student learning performance and engagement in gamified environment for assessment as a learning activity, numbers of gamification platform were developed such as (Kahoot, Socrative, iSpring, and Quizzes). Meanwhile, (Chaiyo & Nokham, 2017) looked at how three different gamification tools like (Kahoot, quizzes, and google form) affected student's engagement, enjoyment, focus, perceived learning, satisfaction and motivation as a learning management system. They found students to be more biased towards Kahoot. Furthermore, they agree that Kahoot and quizzes can boost their concentration, engagement, fun and motivation compared to Google form. While (Zainuddin et al., 2020) The results showed that students were more engaging, motivating, feeling of fun and enjoyment as employment of innovative gamified e-quiz applications like (Socrative, Quizizz, and iSpring).

A. Gamified Online Assessment Environment

One instructional process where gamification might be employed is the assessment stage in higher education, assessment's main objective is to help students learn. As a result, it's important to remember that assessment should prioritize learning (Gardner & Gardner, 2012). For learning to take a place balance between assessment of learning and assessment are required for learning in the assessment process (Stiggins & Chappuis, 2012). As a result, rather than focusing on the evaluation of learning, teachers should focus on assessment for learning. However, it is well established that assessment of learning is given far too much weight, particularly in high-stakes assessments and that tests that increase students' anxiety scarcely support learning (Amrein & Berliner, 2002). It is thought that gamification is supposed to make learning online assessment possible.

In gamified assessment systems, the rewind function allows the student to lose, learn from mistakes, and then discover new ways (Wood et al., 2013). Gamification in e-quizzes used to make formative assessment more attractive and engaging for students (Moreira et al. 2020). In the literature there are only a few studies about implementation of online gamified

4th International Conference on Communication Engineering and Computer Science (CIC-COCOS'2022) assessment for example (Cheong et al., 2013) used a gamified quiz software tool, named Quick Quiz. This tool developed to gives points according to the accuracy of the answers, it showed the leaderboard, provided feedback of the result and showed that students engaged with the learning activity, they had fun during the assessment process. Students in the research also mentioned that they learned more effectively. While (Kocadere & Çağlar, 2015) designed an Online gamified assessment in this study, learner's opinions about this process were obtained using a questionnaire and a focus-group interview.

This study developed the tool with defined components (levels, avatars, the leader board, achievements, content unlocking, virtual goods, points, badge, and teams). Findings of this assessment showed that students found its enjoyable. Also, students stated that they were motivated, and had the feeling of enjoyment, learned and during the assessment had lower exam anxiety. (Petrovic-Dziedz's, 2019) study investigates the use of gamification principles in online learning multiple-choice test, open-book, in order to encourage students to participate in retrieval-based learning activities, The finding shows a high positive correlation between the number of successful retrieval efforts in these tests in gamified environment.

Meanwhile two types of learning strategies were used in this study, gamified e-quizzes using a mobile application and paper-based quiz learning through traditional teaching (Areed et al., 2021), the results showed that student scores in the gamified e-quizzes were higher compared to those who participated in traditional paper-based quizzes. Accordingly, the finding also demonstrated that the students who participated in the gamified e-quizzes indicate more competency and students improved their ability to learn and master new skills both in and out of the classroom. Thus, the main objective of this study to engage students and increasing learning outcome in gamified online assessment environment, this study focuses on develop and evaluate an online gamified environment.

B. Design and development of gamified online assessment

Gamified online assessment environment which is developed for this study, it capable to create MCQ template which were developed base on gamification elements including Virtual Coin, Level Up, Progress Bar, and Hint. Website has been created in order to give access to the students to login into gamified assessment environment.

There are many features that are configured on the website and pages includes the main page Registration, About Us, and How It Works. Lecturer can login to the page with his or her (email address and password). Main sections consist of Dashboard, Student's name, Quiz, Questions, Student Report, Top Student Report, Setting and more setting as shown in the Figure 1.

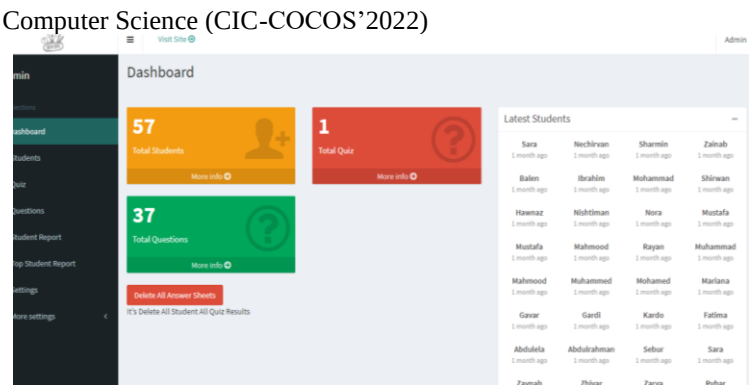


Fig. 1. Main Board

Lecturer can create a quiz template for any subject with MSQ question format, add a question or delete question and edit it. Students can login to attend the quiz. After he/she logins, the quiz template will be seen with all information about the quiz template like (Course name, Per Question mark, Total Mark on the quiz, Total Questions, Total time, and available date and time) as shown in Figure 2 with click on Start Quiz button student can access the quiz in gamified environment as shown in Figure 3.

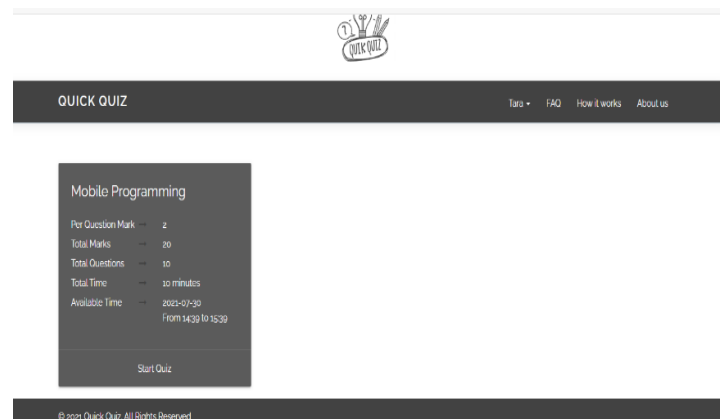


Fig. 2. Quiz Template

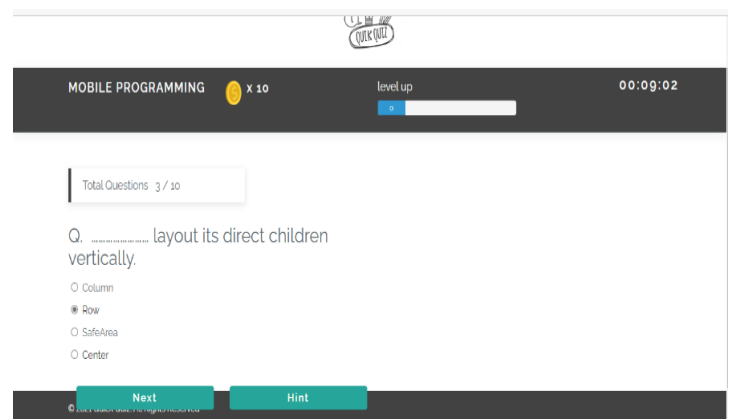


Fig. 3. Gamified Assessment Environment

C. Level Up and Progress Bar

Level Up was used to show the progress of answering the questions in gamified assessment environment and it has a critical role to encourage students about progress in learning activity, meanwhile there is a progress bar to show students' progress for answer the questions.

1) Virtual Coin

In this learning activity virtual coin was used as a game element to engage students answer the question correctly, by default students had Zero value of coins but with answering each question correctly they can get 10 coins and they could show all the coins that are collected at the end of the quiz with its report result as shown in Figure 4.

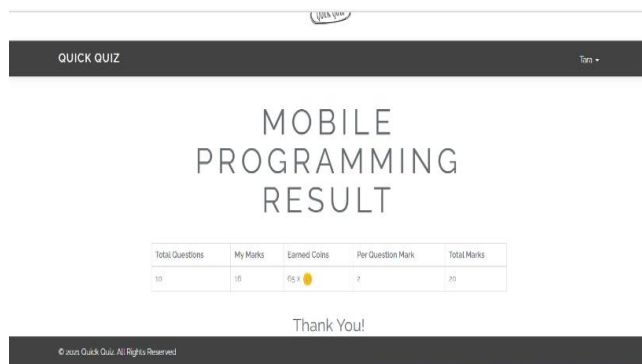


Fig. 4. Result Report

2) Hint

Hint game element that represents an explanation about the question which used in this study. The lack of face-to-face meeting in distance learning led students to have anxieties when they are working on learning activity specially with online assessment by miss understanding the questions, due to it's not easy for students took explanation about unclear questions.

In order to solve this problem in this study hint used as a game element to explanation about the questions, with clicking on hint button student could see the question explanation. However, for each question when students use the hint, if the student answered correctly, he/she can get half value of coins, which means it can get (5 Coins), as shown in Figure 5.

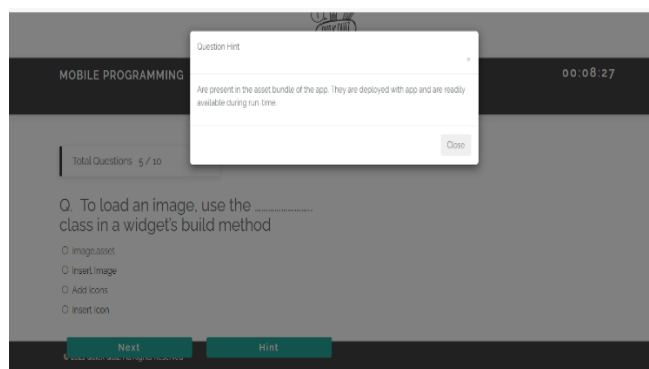


Fig. 5. Hint for explanation about question

III. RESEARCH METHODOLOGY

A quasi-experimental method design was utilized in this study based on gamified online assessment to investigate the impact of gamification environment on student engagement and learning outcomes.

Pre-Test and Post-Test questionnaires were used to investigate the student's engagement in a gamified online assessment environment. The survey was adopted from Zainuddin, Z. *et al.* (2020) which included (17) different questions that have been utilized in this study. The questionnaire format was based on 5-point Likert style ("1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Agree Strongly"). Students were provided with the Pre-Test questionnaire before they attended the online assessment and Post-Test questionnaire after they did the online assessment. The t-test is used to compare the pre- and post-test results to investigate if the gamified online assessment environment impact on student engagement and learning outcome.

IV. DATA COLLECTION

In This study (57) students (25 Females and 32 Males) out of (66) students were participated. The participants were in graduate level (Bcs) Computer Science college registered to Mobile Programming course at a Cihan University Kurdistan Iraq which is a large private university in Arbil City in Kurdistan Iraq.

Gamified environment in online assessment was applied and Moodle as learning management system was used to share website link with students were participated in this experiment, students needed one hour to complete the experiment. In first step student's that participated should answer the pre-test questionnaire so that to be able examine student engagement before applying the gamified online assessment environment. Second step students did online assessment in gamified environment, the quiz consisted of (10) multiple choice questions. To answer each question, they had only one minute, so that students had ten minutes to answer all questions. Lastly after students were completed the quiz should answer the post-test questionnaire so that to be able examine student engagement after applying the gamified online assessment environment.

The pre-test and post-test questionnaires are designed student's replies to the questionnaires were collected and exported to be used as indicators to measure the student engagement in the gamified online assessment environment.

V. DATA ANALYSIS AND RESULTS

In this study, to analyses Pre-Test and Post-Test questionnaires' data IBM SPSS tool is used. descriptive statistics are used to analyses the data to get the frequencies of the Pre-Test and Post-Test results and mean. Moreover, Paired sample t-test is utilized to find the statistical differences between Pre-Test and Post-Test questionnaires.

A. Reliability and Validity Test Results of Pre-Test and Post-Test

Reliability is the approach showing how measurements are correlated with acceptability of the result and findings (Cheston et al, 2013). Validity is how accurate an instrument is at measuring what it is intended to measure. Cronbach's Alpha is one of the tools testing the reliability coefficient showing accuracy of data, when Cronbach's alpha reliability result is less than 0.5 is regarded as poor coefficient reliability. The range from 0.50 to 0.70 is of good reliability and 0.70 to 0.90 is a very good reliability coefficient and above 0.90 is an excellent reliability (Bassioni et al., 2008). In Table 1, according to the statistical result, the pre-test results had excellent reliability coefficient, because the Cronbach's alpha (α) scale was 0.920 which is in values above 0.90

TABLE I SCALE RELIABILITY STATISTICS OF PRE-TEST

CRONBACH'S ALPHA	CRONBACH'S ALPHA BASED ON STANDARDIZED ITEMS	MEAN	N OF ITEMS	N OF PARTICIPANTS
0.926	0.920	2.908	17	57

In Table 2, according to the statistical result, the post-test results had very good reliability coefficient, because the Cronbach's alpha (α) scale was 0.866 which is in values above 0.80

TABLE II SCALE RELIABILITY STATISTICS OF POST-TEST

CRONBACH'S ALPHA	CRONBACH'S ALPHA BASED ON STANDARDIZED ITEMS	MEAN	N OF ITEMS	N OF PARTICIPANTS
0.828	0.866	3.917	17	57

B. Normality Test

In normality test result, it attempts to validate if the data is distributed normally. To demonstrate the normality of collected data and to show the normality of data descriptive statistics used. In general, skewness and kurtosis have been used.

Table 3 demonstrates the normality distribution of data for both Pre-Test and Post-Test questionnaires. Accordingly, skewness and kurtosis were asked to analyses and find out the normality of data. Skewness and kurtosis should be placed between -2.3 and +2.3 to ensure the normality distribution of data.

TABLE III SKEWNESS AND KURTOSIS ANALYSIS FOR PRE-TEST AND POST-TEST

Item	Questions	Pre-Test Skewness	Pre-Test Kurtosis	Post-Test Skewness	Post-Test Kurtosis
1	When I worked on gamification quizzes, Felt interested	0.165	-1.500	-0.963	1.923
2	When I answered questions on gamification quizzes, I felt curious about the correct answers and my progress scores.	-0.823	0.827	0.881	0.225
3	I thought that this class was fun because of the gamified quiz assessments	0.039	-1.389	-0.846	0.999
4	I enjoyed this class because of the gamified quizzes	0.229	-1.233	-1.595	2.153
5	I felt enthusiastic to participate in a gamified learning activity and gamified e-quizzes	0.364	-0.847	-0.589	1.900
6	I worked hard to answer quiz questions on the gamification application	-0.774	-0.103	0.862	0.229
7	I was able to answer quiz questions independently	0.274	-1.226	-1.493	1.961
8	I was able to track my achievement progress after the gamified quiz activity	-0.066	-1.374	-0.775	0.691
9	was able to track my achievement progress after the gamified quiz activity	0.224	-1.191	-0.594	0.651
10	I was able to remember the knowledge I gained from the gamified quiz work	0.232	-1.012	-0.493	1.560
11	I enjoyed learning new things in this class	-0.326	-0.254	-2.107	4.593
12	I tried to be active in asking and answering question during the learning process	-0.278	0.668	-0.304	0.467
13	I wanted to complete the quiz	-0.437	0.021	-2.065	4.226
14	I feel worried when playing Quick Quiz.	-0.662	-0.246	0.994	0.229
15	I felt excited during the quiz.	0.127	-1.409	-0.560	0.742
16	Playing gamified Quiz helps to achieve better grades.	0.089	-1.409	-1.891	3.018
17	Playing Quick Quiz improves my learning performance.	0.152	-1.379	-1.932	4.984

C. Comparison by Using Paired Sample T-Test

Paired sample t-test was used for pre-test and post-test results to illustrate the differences between pre-test and post-test results. Paired samples t-test results explained that there is a significant difference between pre-test and post-test results $t(57) = -7.436, p=0.000 < 0.05$. T-test results. This showed that there is an impressive improvement in the student's opinions since the mean for Post-test was (4.21) which was higher than the mean for pre-test (2.56), and the standard deviation for the Post-Test is 0.700 while the Pre-Test is 1.414 as shown in Table 4

post-test is less than pre-test and the standard deviation of post-test is higher than pre-test.

TABLE IV PAIRED SAMPLES STATISTICS

Pair 1	Mean	N	Std. Deviation	Std. Error Mean
Pre-Test	2.56	57	1.414	0.187
Post-Test	4.21	57	0.700	0.093

The paired sample t-test results, are shown in Table 5, $t(57) = 7.436$, $p = 0.000 < 0.05$. therefore there are significant differences between the Pre-Test and Post-Test.

TABLE V PAIRED DIFFERENCES

Pair1	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. 2-tailed
Pre-Test Post-Test	-1.649	1.674	0.222	-2.093	-1.205	7.436	57	0.000

On the other hand, using the T-test the significant value is 0.242 shown in Table 6, when compared with the level of significance is 0.000. This states that there is a significant difference between the Post-Test and the Pre-Test because 0.242 is greater than 0.000. There has been a difference between the -1.205 and -2.093.

TABLE VI PAIRED SAMPLES CORRELATIONS

Pair1	N	Correlation	Sig.
Pre-Test Post-Test	57	-0.157	0.242

Based on comparison of mean statistics, the results of paired sample t-test showed that considerable differences between the pre-test and post-test are demonstrated, questionnaires concerning each item.

In General, t-test results in Table 7 shows that there is a significant improvement in the student's engagement and learning outcome since the mean for post-test which is higher than the mean for pre-test for each item. Also, the standard deviation for the post-test is less than with the standard deviation for pre-test, while in item two the value of mean for

TABLE VII PAIRED SAMPLES STATISTICS

	Mean	N	Std. Deviation	Std. Error Mean
Pair1 Q1 Pre-Test Post-Test	2.56 4.21	57	1.414 0.700	0.187 0.093
Pair2 Q2 Pre-Test Post-Test	3.75 2.35	57	0.969 1.026	0.128 0.136
Pair3 Q3 Pre-Test Post-Test	2.61 4.32	57	1.206 0.686	0.160 0.091
Pair4 Q4 Pre-Test Post-Test	2.44 4.49	57	1.254 0.782	0.166 0.104
Pair5 Q5 Pre-Test Post-Test	2.65 3.91	57	1.142 0.576	0.151 0.076
Pair6 Q6 Pre-Test Post-Test	3.95 2.89	57	1.042 0.880	0.138 0.117
Pair7 Q7 Pre-Test Post-Test	2.49 4.53	57	1.297 0.710	0.172 0.094
Pair8 Q8 Pre-Test Post-Test	2.68 4.28	57	1.198 0.701	0.159 0.093
Pair9 Q9 Pre-Test Post-Test	2.35 3.70	57	1.077 0.626	0.143 0.083
Pair10 Q10 Pre-Test Post-Test	2.56 4.02	57	1.165 0.612	0.154 0.081
Pair11 Q11 Pre-Test Post-Test	3.16 4.49	57	1.066 0.889	0.141 0.118
Pair12 Q12 Pre-Test Post-Test	3.23 3.79	57	0.846 0.619	0.112 0.082
Pair13 Q13 Pre-Test Post-Test	3.30 4.65	57	1.034 0.668	0.137 0.088
Pair14 Q14 Pre-Test Post-Test	3.93 2.11	57	1.033 1.113	0.137 0.147
Pair15 Q15 Pre-Test Post-Test	2.42 4.16	57	1.149 0.676	0.152 0.090
Pair16 Q16 Pre-Test Post-Test	2.60 4.28	57	1.334 1.130	0.177 0.150
Pair17 Q17 Pre-Test Post-Test	2.75 4.42	57	1.443 0.823	0.191 0.109

VI. FINDINGS

In this study according to analysis data the results showed that student average as highly accessed into the gamified learning activity like gamified online quiz as a formative assessment, research questions can be answered according to the finding. The first research question was what are the effects of utilizing web-based gamification as a formative assessment platform on students' engagement and learning performance. Students were recorded as highly accessed with gamification environment to complete the quiz and engage them and answer all question independently. Second question was does gamification as a formative assessment platform have a good impact on students' learning outcomes. Student recorded high

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percentage that playing with gamified online quiz had a great role to improve learning performance and it helped them to achieve better grade, good result and encourage them to ask more questions and answer questions during learning process.

The third question was what are the students' learning experiences and perception of involvement for participating in gamified online assessment. According to the results, students were very interested when participated in gamified online assessments and they enjoyed learning new things and showed that the class will be fun with gamification environment. Fourth question was how does gamification as a formative assessment platform affect student engagement in learning. The analysis result showed that using gamification environment was enjoyable and students recorded a high range and were exited during gamified quiz.

Meanwhile in the analysis result in step four normality test was used to find out whether the data was distributed normally or not as descriptive statistics were used. In general, the kurtosis analysis post-test result showed that in questions (Q11, Q13, Q16, and Q17) the values were greater than normal range according to (L. Ming and L. G. Richard, 2005), it was discussed that both skewness and kurtosis should be placed between -2.3 and +2.3.

VII. DISCUSSION

The goal of planned research is to see how gamification impact on student's engagement and learning outcome in distance learning environment. Educators from a variety of fields have demonstrated benefits of gamification in higher education with evidence of engagement, improved attitude, enjoyment, motivation, (perceived) learning, participation, practical skills, retention, satisfaction and student performance (grades) (Aldemir et al., 2018; Subhash & Cudney, 2018). Employing gamification gave students chance to observe professionalism in practice. The findings of this study indicated that gamified online assessment worked positively to engage students particularly enhancing learning and encouraging them to work on learning activities such that online assessment with the involvement of game principles such as Virtual Coin, Level Up, Progress Bar, and Hint.

Some of studies used gamified environment for online assessments such as (Zainuddin, Z. et al. 2020) the results of this study showed that using game elements such as points, progressions, badges, contests, certificates, memes, and leaderboards in gamified e-quiz helped students to become more engaged and encouraged them in learning process. Meanwhile (Kocadere & Çağlar, 2015) designed an Online gamified assessment with various gamification components, such as avatars, levels, content unlocking, the leader board, achievements, virtual goods, points, teams and badges, the findings showed that all students were enjoyable with in this assessment process.

Also, students stated that they were motivated, and had the feeling of flow learned and during the assessment they had lower exam anxiety, meanwhile the findings related with this study mentioned that it had numbers of negative responses such as the themes of the leader board and content unlocking were focus of these negative comments, some students stated that it

may have been stressful classified low on the leaderboard. According to (Jurgelaitis et al. 2019) student's grades can increase as a result of applying gamification in their learning.

In this study results have shown that the majority of the participant agreed with gamification environment and had a great impact on improving their learning performance and they could track progress on achievement after gamified activity. In gamified online assessment named Quick Quiz, it helped students to answer all questions and they were interested when they worked with gamified quiz, in away progress bar and level up students able to follow up answering questions and it encourage them to complete the quiz successfully.

The finding also showed that students were highly engaged with the gamified environment when they worked on gamified quiz and were able to remember the knowledge that gained from the quiz. For instance, in this study hint was developed as a game element which was used to explanation about questions. This had an important role to motivate student's about answering the questions correctly and independently also it led to student's could achieved better grades. Meanwhile the analysis of student's grades reported by (Jurgelaitis et al., 2019) verified that by incorporating gamification into student's learning, their grades will improve.

In fact, in gamified environment various studies have found evidence of the positive association between student engagement and learning performance.

In this study other important effect of gamification was the developed tool enjoyable for students when worked on online quiz. This found in analysis result that showed high average of students who agreed with enjoyed in gamified quiz and they felt excited during the quiz. Students who are enthusiastic to participate in this activity also be engaged in enjoyable experiences in the learning activity.

VIII. CONCLUSIONS, LIMITATION AND FUTURE WORK

Gamification is a constantly evolving innovative approach to education. To enhance student engagement gamification has been emerged. Future research should focus on the new mechanics and new applications related with emerging gamification technologies. Meanwhile the majority of the studies in this area used gamification to assess student engagement and increasing learning outcome in distance learning.

The objective of this study was to develop a web-based tool in which gamification is used to engage and enhance learning. To that end, a learning activity, supported by a gamified e-quiz tool named Quick Quiz, was developed, it was specifically developed to facilitate the gamified learning activity as a formative assessment for MCQ question type. Students were attracted by Quick Quiz as they had never experienced it before with gamification. This tool was developed to increase students' engagement and learning outcome, game elements was used such as Virtual coin, Level Up, Progress Bar, and Hint In non-gamified contexts.

The Result of this study indicated that using those game element had a great impact on students' engagement such as answering questions correctly they can get a virtual coin. While with misunderstanding the questions could use hint as a game

element to explanation about the questions and it can lead students to get better achievements and improved learning outcome. In terms of limitations of this study, the number of participants were small and this approach is only applied in one course, while it can be applied in another courses.

Future research is needed to see if gamification helps learning through a variety of strategies and to see how gamified activity may be used in the distance learning in different ways.

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