

The Significance of Online Quizzes and Gamification in Enhancing Students' Motivation in Diploma in Nautical Studies

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ABSTRACT

This study focuses on the use of online quizzes and gamification in enhancing students' motivation at the Akademi Laut Malaysia (ALAM), particularly for Diploma in Nautical Studies programme. This exploratory study aims to reap the benefits of using learning technologies such as the online quizzes and gamification in maritime education and training. As the International Maritime Organisation (IMO) Standards of Training and Certification for Watchkeeping (STCW) syllabus covers vast areas of sea navigation, seamanship, safety and shipping (maritime knowledge and competencies), it is timely to promote digital learning methods in classroom especially those that could increase students' motivation in learning. The results of quantitative study on 152 respondents of first year nautical cadet officers showed that online quizzes and gamification were the preferred delivery

methods in classroom compared to other methods used. Finally, the results of study also proved that online quizzes and gamification were significant in enhancing students' motivation. This has a significant impact on current policy and teaching and learning strategies for Maritime Education and Training (MET).

Keywords: *Online quizzes, Gamification, Motivation, Learning technologies, Nautical studies*

INTRODUCTION

The advent of technology in information and communication has tremendously impacted human being nowadays. The world has witnessed vast improvements in all fields especially in the last decade. Today, the Information and Communication Technology (ICT) has also brought wonders in the educational field especially in lesson delivery, teaching facilities, teaching repository, learning resources (the internet) and etc. Hence, the concept of electronic learning has already taken place either to complement or to replace traditional learning. Nevertheless, the aspiration of this paper is to complement the existing learning with innovative learning applications such as online quizzes and gamification.

There have been extensive studies on gamification and online quizzes in the world and in Malaysia to date; but none focuses on the maritime industry especially the Maritime Education and Training (MET). It is timely now for MET to embark on such a study so as to utilize the full advantage ICT in education. The International Convention for Standards of Training and Certifications for Watchkeeping (STCW) for seafarers have already mandated the ICT in its venerable model courses. These model courses provide minimum guidelines or standards for comprehensive training courses to all seafarers worldwide.

LITERATURE REVIEW

Learning is an active process and requires motivation to begin, continue and complete the process (Glover, 2013). Even though motivation is ever-present in young, vibrant learners, it can diminish according to several factors. Among these factors is the monotonous learning regime as a result of long routine process. The emergence of new information and communication technologies has made educationists and educators to make breakthroughs in teaching and learning. According to Bidder et al. (2015), one of these breakthroughs is the development of online or electronic learning applications that enhance students' motivation.

Researchers such as Buckley, Doyle and Doyle (2017), Enfield (2016), Huang et al. (2016), Chang (2016) and Hashim, Tan and Rashid (2015) discovered that web-based applications such as online quizzes and gamification have increased student motivation, engagement and interests. These web based tools are developed as learning interventions which provide alternative ways to achieve learning goals in classrooms. In conjunction with this, Harandi (2015) reported that these e-learning or web based applications are "*elements that affect student's motivation*" (p.423). This is due to the fact that new technologies have potentials to modify instructions and these modified instructions should be fully exploited to enhance motivation, generate interests and thus maximize learning. From this point onwards, in this study, these new technologies are referred to as online quizzes and gamification. The following paragraphs shed lights on the previous studies' findings in the significance of online quizzes and gamification in higher education, particularly in enhancing students' motivation.

Salas-morera, Arauzo-azofra, and García-hernández (2014) integrated online quizzes as a teaching and assessment tool in the general program of the subject Proyectos in the third course of Ingeniero Técnico en Informática de Gestión over five consecutive years. The results showed positive influence on students' motivation and academic performance. The survey also revealed that students preferred to use online quizzes in course instruction. Cann (2014) examined the possibilities for increasing students' engagement with the simplest tools available in any standard virtual learning environment and available to all, which are the online quizzes. Results which were obtained from a large student cohort indicated that online quizzes were able to achieve high levels of student satisfaction and motivation.

Gamification, on the other hand, involves using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems as discovered by Kapp (2012). Accordingly, Cheong, Cheong, and Filippou (2013) stated that by engaging the students with learning activities in gaming can help improve the quality of learning and motivation. Questionnaires were used after the activity was made using a gamified multiple-choice quiz which was implemented to undergraduate IT-related course. The results showed some degrees of engagement and enjoyment. The majority of participants (77.63%) reported that they were engaged enough to complete the quiz and 46.05% stated they were happy while playing the quiz. In terms of learning, the overall results were positive since 60.53% of students stated that it enhanced their learning effectiveness and motivation.

Buckley, Doyle, and Doyle (2017) explored students' perceptions of a gamified learning intervention deployed in a large undergraduate module and a small postgraduate module. Focus groups were carried out to develop understanding of the students' perceptions of a gamified learning environment. One of the themes emerged was motivation, besides the impact on learning outcomes, the importance of the stakes, group dynamics, gender and challenges that gamified learning activities present. The study evaluated students' perceptions of the effectiveness of gamification, providing guidelines for other practitioners deploying gamified learning interventions and identifying outstanding issues and questions that require further research.

Cheong, Filippou, and Cheong (2014) in their studies, used gamification as a tool to improve learning environment as traditional approaches did not seem to be engaging with students earlier. A survey was done to 51 undergraduate IT students to obtain their perceptions on game elements, which were the building blocks of what made a game identifiable as such through a development of a game-like learning system. It was found that undergraduate students had a positive perception of systems that use game elements and were interested in its use for learning. In overall, students favoured social interaction, engagement, feedback, and increased learning, which concluded that gamification is suitable for learning approaches such as social constructivism. More importantly, the study revealed that gamification had enhanced students' motivation level.

The studies of Harandi (2015) concluded that there existed significant relationship between e-learning applications such as online quizzes and gamification with students' motivation. The study highlighted that, students were more motivated when such e-learning tools were applied in classroom. In addition, *“when they were more motivated to learn, they were likely to be engaged; if they were engaged with lessons, they were more likely to achieve the learning objectives”* (p.429). So it is highly recommended to use online quizzes and gamification as part of learning instructions in higher education.

METHODOLOGY

Respondents and Researchers

This study was conducted on 152 respondents from the Akademi Laut Malaysia (ALAM), Kuala Sungai Baru, Masjid Tanah, Melaka. Their age ranged from 18 to 24 years old and they were undertaking Diploma in Nautical Studies in semester 1, 2 and 3. The subjects of focus were Business English, Maritime English, Malaysian Studies, Professional Ethics, Introduction to Chartwork, Introduction to Ship Stability and Meteorology. The respective researchers for this study were Dr. Shamsul Rizal bin Haji Mohd Rosedi for Business English and Maritime English, Mr. Mohd Asri bin Md. Sap for Malaysian Studies and Professional Ethics, Captain Mazlan Hamid bin Hamzah for Introduction to Chartwork and Introduction to Ship Stability subjects and Captain Fariq Fadhli bin Abdul Malik for Meteorology.

Online Quizzes

Online quizzes for the study were created by an online application website which can be accessed at <https://www.qzr.com/>. This website offers free and user-friendly online quizzes for educators. Educators could create quizzes for their subjects within minutes via this website and there is minimal restriction in terms of the number of questions and features. The subjects specifically involved with online quizzes in this study were Business English and Maritime English.

Gamification

Gamified quizzes for the study were created by one of the most popular applications for gamification, Kahoot! The application is well-known for its game-like features which enhance the competitive spirits in classroom learning. Students shall compete among themselves in this rich gamification setting. The subjects involved in gamification were Maritime English, Project Paper, Malaysian Studies, Professional Ethics, Introduction to Chartwork, Introduction to Ship Stability and Meteorology.

Research Design and Instrumentation

Class experiments on online quizzes and gamification were conducted over a month period in which researchers conducted the experiments at the end of each target lesson so as to provide a quick review of the lesson proper. Respondents were asked to bring along their own device (BYOD=Bring Your Own Device) and use them to access the links which then directed them to the respective quizzes and gamification sites. Data collection was conducted at the end of the experiment month where all 152 respondents were asked to answer an online survey containing self-administered questionnaire which provided quantitative feedback to the author and researchers. The survey questionnaire set consisted of 23 self-constructed questions and it was divided into 3 sections, Section A, Section B and Section C. Section A used multiple choice format for obtaining demographic data from respondents through 2 questions. Section B had 8 multiple-choice questions that focused on online quizzes and gamification while Section C had 13 questions on online quizzes and gamification with students' motivation. All 13 questions in Section C used 5 point *Likert Scale* ranging from 1) *Strongly Disagree*, 2) *Disagree*, 3) *Neutral*, 4) *Agree* and 5) *Strongly Agree*.

Accordingly, a reliability test on all questions was conducted by using *Cronbach coefficient alpha* of the SPSS software. The *Cronbach coefficient alpha* value was obtained at 0.756 for all 23 questions. Nunally (1978) proposed the value of 0.7 as the basic reliability for research questionnaire. Hence, it can be summarized that for this study, there is an acceptable level of reliability in all self-constructed questions used in this research. Table 1 below depicts the Alpha value for the survey questionnaire.

Table 1: Reliability Statistics

Cronbach's Alpha	N of Items
.756	23

Data Analysis

All collected data were analyzed by the SPSS software version 22. Descriptive analysis was performed on all questions to obtain means and standard deviations. Pearson Product Moment Correlation test was also performed to calculate the correlation between online quizzes and gamification with students' motivation in this study.

Research Questions

The research questions of this study have been formulated as follows:

1. What is the level of students' preference for online quizzes and gamification if compared with other types of learning methods?
2. What are the advantages of online quizzes and gamification in learning?
3. Do online quizzes and gamification motivate students to perform better?

RESULTS AND DISCUSSIONS

Respondents' Profile and Experience in Using Online Quizzes and Gamification

Table 2 indicated that the majority of respondents were male (96.1%) in the age group of 18 to 24 years old. This corresponds with the fact that the number of male cadets enrolling at the Akademi Laut Malaysia (ALAM) far exceeds the number of female cadets (3.9%) for junior cadets. Moreover, the number of female cadets has been steadily fixed at 5% of intake annually. Semester 1 cadets were the majority in this study with 50.7%, followed by Semester 3 cadets (36.8%). The minority group of respondents was the Semester 2 cadets with only 12.5%.

For the frequency of doing online quizzes and gamification per subject, suffice to mention that majority of respondents (75.7%) had done it between 3 to 4 times per subject in both experiments (online quizzes and gamification). Altogether, there were 7 subjects in this research as stated earlier in this paper. Meanwhile, 17.1% of respondents had done it between 5 to 7 times per subject and only 4.6% did it more than 7 times of online quizzes and gamification per subject. It is also noted here that 2.6% of respondents did both experiments in only 1-2 times per subject and this was the minority group in this category. From Table 2, it can be summarized that all respondents in this study had been sufficiently exposed to online quizzes and gamification before they attempted the survey questionnaire.

Table 2: Respondents' Profile

	Item	%
Gender	Male	96.1
	Female	3.9
Age	18 – 24	100
Semester	Semester 1	50.7
	Semester 2	12.5
	Semester 3	36.8
Frequency of doing online quizzes and gamification per subject	1 - 2 times	2.6
	3 - 4 times	75.7
	5 - 7 times	17.1
	More than 7 times	4.6

To discuss further, Table 3 below shows respondents' feedback on the other two questions in Section A and B that focused on online quizzes and gamification. It is also noted that the level of students' preference was very high for both statements. The respondents strongly agreed that the online quizzes and gamification have made them more interested in their lessons. The mean score obtained for the statement, "*Online quizzes and gamification made me more interested in lessons*" was 4.49. Moreover, they also agreed that both web based tools were helpful in their studies. The mean score obtained by the statement, "*Online quizzes and gamifications are helpful in my studies*" was 4.20. Both findings give the indication that online quizzes and gamification have potential in maximizing learning. Hence, they should be integrated in more significant ways in teaching and learning process at ALAM.

Table 3: Respondents' Feedback on Online Quizzes and Gamification Mean SD

	Mean	SD
Online quizzes and gamification made me more interested in lessons	4.49	.587
Online quizzes and gamification are helpful in my studies	4.20	.838

Analysis on Research Question One: What is the Level of Students' Preference for Online Quizzes and Gamification if Compared with the Other Types of Learning Methods?

Table 4 below shows the means and standard deviations of 5 questions in Section B which specifically focused on students' preference of online quizzes and gamification in comparison with the other methods of learning applied at ALAM. These 5 questions were included to evaluate further respondents' preference of online quizzes and gamification as part of teaching and learning at ALAM. The findings showed that the overall mean scores obtained by all statements ranged from 3.65 to 4.60. Even though the scores obtained were considered high, three statements received mean scores below 4.00 (*meanscore*<4.00) while two statements received mean scores of more than 4.00 (*meanscore*>4.00). The three statements which represented the learning methods that received means score below 4.00 were *lecture* (3.79), *textbook & course notes*(3.65) and *presentations & discussions* (3.91). On the other hand, the two statements that obtained mean scores of more than 4.00 were *class activities & practical sessions* (4.26) and *online quizzes & gamification* (4.60). In Table 4, all the statements were listed according to the highest mean score received. To summarize the findings in this section, it is noted that majority of respondents preferred online quizzes and gamification more than the other 4 types of learning methods used. This can be seen from the highest mean score obtained by online quizzes and gamification in comparison with the other types of learning methods.

Table 4: Respondents' Preference on Types of Learning Methods

	Mean	SD
State the level of preference on each of the learning methods below:		
Online quizzes & gamification	4.60	.518
Class activities & practical sessions	4.26	.750
Presentations & discussions	3.91	.841
Lecture	3.79	.866
Textbooks and course notes	3.65	.930

Hence, to answer Research Question 1, it can be stated here that the online quizzes and gamification were the most preferred types of learning by respondents in this survey. This was followed by class activities and practical sessions, presentations and discussions, lecture and lastly, textbooks & course notes.

Analysis on Research Question Two: What are the Advantages of Online Quizzes and Gamification in Learning?

It is also essential for every research to find out the advantages of subject which is being studied. Hence, this paper is not complete without highlighting the advantages of online quizzes and gamification. It is also hoped that the findings of this study could confirm other studies' findings which highlight the benefits and potentials of these two web-based tools. Hence, in Section C, 8 questions/statements had been constructed to obtain respondents' feedback on the possible advantages of online quizzes and gamification. These questions were placed in sequence in the questionnaire for better identification by respondents. Statements which received high mean scores i.e. mean scores of more than 4.00 (*mean score*>4.00) shall be considered as advantages of online quizzes and gamification for this study. Table 5 below lists down these statements for better discussion.

Table 5: Statements that Indicate Advantages of Online Quizzes and Gamification

	Mea n	SD
Online quizzes & gamification help me to review my lessons.	4.43	.697
Online quizzes & gamification motivate me to study harder.	4.67	.471
Online quizzes & gamification promote healthy competition in getting the best academic results.	4.53	.680
Online quizzes & gamification help me find out what I don't know so I can learn it.	4.55	.669
Online quizzes & gamification make me want to read more or refer to my course notes on the specific lesson.	4.56	.638
Online quizzes & gamification increase my interest in the lesson.	4.44	.688
I pay more attention in classes that use online quizzes & gamification.	4.48	.754
I learn faster and better in classes that uses online quizzes & gamification.	4.53	.680

From Table 4, it is obvious that all statements obtained very high mean scores and this makes them the best possible advantages of online quizzes and gamification as perceived by respondents in the study. All of them obtained high mean scores of more than 4.00 which ranged from 4.43 to 4.67. Therefore, it can be concluded that all 8 statements are indication of the advantages of online quizzes and gamification as they *help students to review lessons, motivate them to study harder, promote healthy competition, help to identify weak topics, make them to read their notes further, increase level of interest in lessons, pay more attention in class and lastly learn faster than traditional methods of delivery*. The most preferred advantage as indicated by this study is “*motivate students to study harder*” (mean score = 4.67) while the least preferred is “*help to review my lesson*” (mean score = 4.43).

From these identified advantages, it can be therefore concluded that online quizzes and gamification are significant in learning to students of Diploma in Nautical Studies at ALAM. But it is important to note here that these 8 advantages are not all the advantages of online quizzes and gamification. There have been numerous studies on online quizzes and gamification that have resulted in more and different advantages to date.

Analysis on Research Question Three: Do Online Quizzes and Gamification Motivate Students to Perform Better Academically?

To address Research Question Three, a two-tier analysis was conducted so as to be more objective in discussion. The first tier involves the listing down of mean scores of the statement that is most suitable to represent the concept of 'motivation' in association with online quizzes and gamification. The identified statement is listed in Table 6 below. The statement, "*online quizzes & gamification motivate me to study harder*" is the best statement to answer the research question in this section for the first tier analysis.

Table 6: Statement That Indicate Motivation and Its Association with Online Quizzes and Gamification

	Mean	SD
Online quizzes & gamification motivate me to study harder	4.67	.471

From the mean score obtained by the statement, respondents have indicated that the online quizzes and gamification had motivated them to work harder, academically. This can be further supported by the other two statements in the questionnaire which were also related to the statement, "*Online quizzes & gamification motivate me to study harder.*" The two statements are "*online quizzes & gamification make me want to read more or refer to my course notes on the specific lesson*" and "*online quizzes & gamification increase my interest in the lesson*". From these, it can be said that the research question has been partially addressed. The second tier of analysis involves the use of correlation matrix in obtaining the correlation between online quizzes and gamification with student motivation. For this purpose, Pearson correlation is among the best methods in determining the correlation or association. Table 7 presents the Pearson correlation matrix between online quizzes and gamification with students' motivation for better discussion and conclusion.

Table 7: Correlation Matrix between Online Quizzes and Gamification with Motivation

		GMF	MTV
GMF	Pearson Correlation	1	.626**
	Sig. (2-tailed)		.000
	N	152	152
MTV	Pearson Correlation	.626**	1
	Sig. (2-tailed)	.000	
	N	152	152

** . Correlation is significant at the 0.01 level (2-tailed).

The Pearson correlation shows that the relationship between online quizzes and gamification and students' motivation was found to be positively and strongly related ($r = +0.626$, $p < 0.001$). Hence, Table 7 confirms that there is a statistically significant correlation between these two variables. Therefore, it can be concluded that online quizzes and gamification have enhanced students' motivation in this study. The mean scores obtained by the statements and the Pearson correlation matrix confirm this relationship.

CONCLUSION AND IMPLICATIONS OF STUDY

This study focuses on the significance of online quizzes and gamification in enhancing students' motivation for Diploma in Nautical Studies at the Akademi Laut Malaysia (ALAM). From the results obtained, it is obvious that there exists a significant relationship between online quizzes and gamification with students' motivation. Moreover, besides motivating students, both e-learning tools have found to bring advantages such as helping students to review lessons, motivating them to study harder, promoting healthy competition, helping to identify weak topics, making students to read their notes further, increasing level of interest in lessons, paying more attention in class and lastly, learning faster than traditional methods of delivery. These findings are important as applying e-learning tools such as the online quizzes and gamification in learning requires careful consideration. This shall make maritime educators and educationists to plan and have more engaging yet effective teaching and learning approaches so as to have more motivated students and better academic results.

This study paves way for more research on ALAM students' motivation and e-learning applications in maritime education and training. It is also timely now to consider these e-learning applications as part of the strategies in Maritime Education and Training (MET) institutions so as to have more effective and engaging learners. These effective and engaging learners are not only responsible for their learning but also are empowered to shape the learning process which defines the achievement of learning objectives in wider perspectives. Encouragements should also be given to maritime educators and educationists to conduct more extensive studies on digital technology applications in teaching learningsuch as flipped classroom, Multimedia Learning System(MMLS), blended learning, mobile learning and augmented reality. Indeed, the standards of training as emphasized by the STCW need to be complemented with powerful tools of electronic learning so as to produce competent seafarers who are not only motivated, skillful and knowledgeable, but are also technology savvy.

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