



The effectiveness of gamification technique for higher education students engagement in polytechnic Muadzam Shah Pahang, Malaysia

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Abstract

In recent years, gamification is becoming popular in education development to enrich students experience in classroom. However, there is still lack of awareness among educators and the concern of whether the gamification technique is acceptable by students. This paper presents the effectiveness of gamification technique to improve students' engagement in Database Design subject at Polytechnic Muadzam Shah Pahang, Malaysia. A framework to implement the gamification technique in higher education is also described. As for the evaluation, an empirical investigation method is adapted and data was collected based on Technology Acceptance Model (TAM) and Student Course Engagement Questionnaire (SCEQ). The evaluation results indicate that the students positively inclined towards gamification caused by the ease of the platform used rather than the benefits that they can obtain from the gamification, concluding that Perceived Ease of Use (PEOU) is a better indicator for students' attitude towards gamification.

Keywords: Gamification, Higher education, Students' engagement

Introduction

Student engagement is known as an important attribute to influence students' achievement. Students' preceding learning (readiness), enthusiasm for learning, and the way the input is introduced to them are some of the factors that influence their ability to learn (Elteгани and Butgereit 2015). Diverse learning styles among the students also contribute to the way they engage in the activities conducted by the educators. Sustaining the students' interest and participation is a struggle that leaves the educator in a quandary. This is because students' involvement plays an important factor in their achievement and performance (Handelsman et al. 2005) measured during either the formative or summative assessment. Mohd et al. (2016) found that active students are more likely to perform well as they retained more knowledge during learning activities.

Several studies referred to gamification as a technique to increase the students' engagement (Hanus and Fox 2015; Kuo and Chuang 2016; Sanmugam et al. 2016). Gamification is the use of game design elements in non-game settings to engage participants and encourage desired behaviors. Technological developments allow the use of game elements

in a non-game context by extending the methods that can be employed by educators in developing lesson plans. Not all educators are creative enough to include gamification in their lessons, thus online platforms such as Kahoot!, Quizizz, Socrative, and Quizalize provide excellent options for educators to choose from in diversifies lesson plans and activities that can captivate and inspire students’ motivation and increase students’ engagement during lessons in the classroom.

The dynamic of games has influence the popularity of gamification in the effort to enrich students experience in their learning journey, especially in a classroom. This paper explores the effectiveness of gamification technique to improve the students’ engagement in database subject implemented in Polytechnic Muadzam Shah Pahang, Malaysia. Following the introduction, Section “[Related Study](#)” presents related studies on students’ engagement and gamification. This is then followed by Section “[The Research Framework and Model](#)” that elaborate on research framework and model. Sequentially, Section “[The Empirical Investigation Instruments](#)” describes the empirical investigation instruments to evaluate the gamification effectiveness and Section “[Results and Discussion](#)” presents the results and analysis. Finally, Section “[Conclusion](#)” concludes the paper.

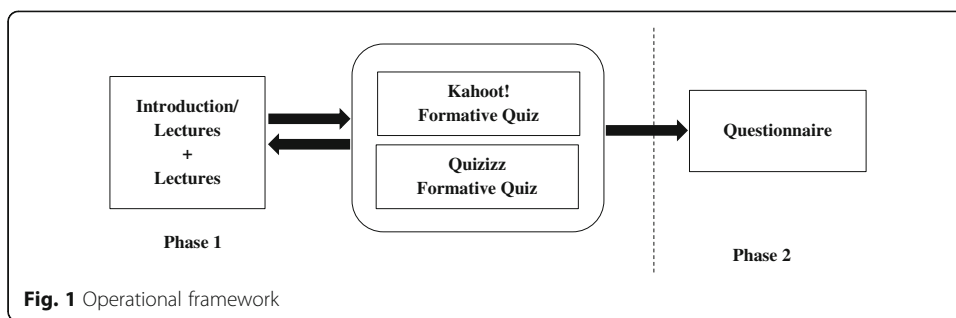
Related study

There are many definitions arose from numerous studies regarding the term of student engagement. Most literature found, defined student engagement as activities performed either physically or mentally by students in their pursuit to gain knowledge (Dixson 2015; Mohd et al. 2016; Marx et al. 2016). In a different angle, a study by Hu et al. (2016) define it as engagement that happens when students are using online learning platform in their learning as in this environment; the learning materials can only be accessed by the students themselves.

These studies also identify factors that contributed the students’ engagement. Mohd et al. (2016) and Hu et al. (2016) stated that students engagement comprised of three dimensions; cognitive, behavioural and emotional engagement. Other studies by Handelsman et al. (2005), Dixson (2015) and Marx et al. (2016) however categorized student engagement into four factors which are skill engagement (represented by skill displayed by students), emotional engagement (represented by students’ feelings), participation (represented by activities done by students in learning) and performance

Table 1 Comparison of Game Elements used in previous studies

Game Mechanics	Reference				
	Kuo and Chuang (2016)	Hanus and Fox (2015)	Sanmugam et al. (2016)	Hamari (2015)	Barata et al. (2013)
Badges	√	√	√	√	√
Leaderboard	√	√	√		√
Challenges					√
Levels	√				√
Points	√		√		
Online activity	√				
Incentive	√	√			
XP					√



engagement (represented by the result of assessments done by students). In addition, Marx et al. (2016) also listed another engagement which is total engagement to measure the students’ perception of their overall engagement in one of the course taken in the college.

Based on the literature, several significant influences were identified. Relationship between students and educator was found to play very important role in students’ engagement (Mohd et al. 2016; Marx et al. 2016). Furthermore, Marx et al. (2016) also stated that educators’ expectation for the students to be engaged in classroom can be met if the educators themselves reciprocate this expectation towards the students.

Today, wealth of technologies available in the world of education makes traditional learning (chalk and talk method) more and more marginalized. This method of learning is considered to be teacher-oriented and becoming increasingly less used by today’s educators. In recent years, the concept of gamification in education is gaining a foothold as an area of study among researchers. Researchers describe gamification as infusing game component into a non-game context (Hanus and Fox 2015; Kuo and Chuang 2016) which can be used as a mean to promote student engagement in the classroom (Hamari 2015; Hanus and Fox 2015; Sanmugam et al. 2016). Leaderboard, badges, points and levels are some of the game elements employed in previous studies (Barata et al. 2013; Hamari 2015; Hanus and Fox 2015; Kuo and Chuang 2016; Sanmugam et al. 2016). According to Table 1, badges are the top choice of researchers to be used in the gamification being implemented followed by leaderboard. This may be caused by users’ perception that badges will highlight their social status to their peers (Hamari 2015). Although most studies found that gamified learning has a positive impact on student engagement (Barata et al. 2013; Hamari 2015; Kuo and Chuang 2016; Sanmugam et al. 2016), the discovery

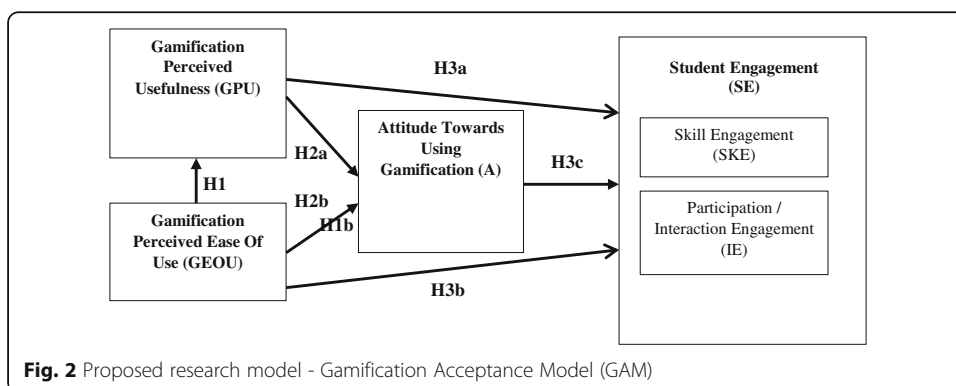


Table 2 Survey items

		Scale
1.0 Demographic Items/M Measurement		
1	Gender <i>Jantina</i>	Male or Female
2	Age <i>Umur</i>	Age Range
2.0 Perceived Usefulness Items (PU)/Measurement		
PU1	Using the online gamification system improves my learning performance <i>Menggunakan sistem gamifikasi atas talian meningkatkan prestasi pembelajaran saya</i>	5 point Likert scale
PU2	Using the online gamification system increases my learning outcome <i>Menggunakan sistem gamifikasi atas talian meningkatkan hasil pembelajaran saya</i>	5 point Likert scale
PU3	Using the online gamification system enhances my desire to produce desired result in my learning <i>Menggunakan sistem gamifikasi atas talian meningkatkan keinginan saya untuk mencapai hasil yang diinginkan dalam pembelajaran saya</i>	5 point Likert scale
PU4	Using the online gamification system is useful in my learning <i>Menggunakan sistem gamifikasi atas talian adalah berguna dalam pembelajaran saya</i>	5 point Likert scale
3.0 Perceived Ease of Use Items (PEOU)/Measurement		
PEOU1	I find the online gamification system to be flexible to be used <i>Saya mendapati sistem gamifikasi atas talian adalah fleksibel untuk digunakan</i>	5 point Likert scale
PEOU2	The online gamification functionality and interface is clear and understandable <i>Fungsi dan antaramuka gamifikasi atas talian adalah jelas dan mudah difahami</i>	5 point Likert scale
PEOU3	Interacting with the online gamification system does not require a lot of my mental effort <i>Berinteraksi dengan sistem gamifikasi atas talian tidak memerlukan banyak usaha mental saya</i>	5 point Likert scale
PEOU4	Overall, I believe that the online gamification system is easy to use <i>Secara keseluruhan, saya percaya bahawa sistem gamifikasi atas talian adalah mudah untuk digunakan</i>	5 point Likert scale
4.0 Attitude (A)/Measurement		
A1	I think that using online gamification system is a good idea <i>Saya fikir yang menggunakan sistem gamifikasi atas talian adalah idea yang baik</i>	5 point Likert scale
A2	I like learning with online gamification system <i>Saya suka belajar menggunakan sistem gamifikasi atas talian</i>	5 point Likert scale
A3	I look forward to those aspects of my learning that require the use of online gamification system <i>Saya menantikan aspek-aspek pembelajaran saya yang memerlukan penggunaan sistem gamifikasi dalam talian</i>	5 point Likert scale
5.0 Skill Engagement (SKE)/Measurement		
Online gamification system encourage me in: <i>Sistem gamifikasi atas talian menggalakkan saya di dalam:</i>		
SE1	Taking good notes in classroom <i>Mengambil nota yang baik di dalam kelas</i>	5 point Likert scale
SE2	Listening carefully in classroom <i>Mendengar dengan teliti di dalam kelas</i>	5 point Likert scale
SE3	Making sure to study on regular basis <i>Memastikan untuk mengulangkaji secara berterusan</i>	5 point Likert scale

Table 2 Survey items (Continued)

		Scale
6.0 Interaction Engagement (IE)/Measurement		
Online gamification system contribute to me in: <i>Sistem gamifikasi atas talian menyumbang kepada saya:</i>		
IE1	Having fun in the classroom <i>Mempunyai masa yang menyenangkan di dalam kelas</i>	5 point Likert scale
IE2	Participating actively in small-group discussions <i>Mengambil bahagian secara aktif dalam perbincangan kumpulan kecil</i>	5 point Likert scale
IE3	Helping fellow students <i>Membantu rakan-rakan pelajar</i>	5 point Likert scale
IE4	Asking questions when I did not understand the lecturer <i>Bertanya soalan apabila saya tidak memahami pensyarah</i>	5 point Likert scale

from Hanus and Fox (2015) contradict this finding. Hanus and Fox (2015) found that over time, students experiencing gamified learning showed a decline in their motivation thus affecting their final exam scores. The researchers attribute this decline to the expiration of novelty of the method used as the research was conducted over the period of 16 weeks. This led to the conclusion that any gamification undertaken must be considered with great care as to it not being a detrimental to the students as opposed to helping them in their learning.

Some researchers also study the gamification platforms which use web-based students' response systems such as Kahoot! and Quizizz (Wang 2015; Wang and Lieberoth 2016; Chaiyo and Nokham 2017; Sawang et al. 2017). Wang (2015), found that Kahoot! implementation in different situation (event and semester) by two groups of students produce the same result as both groups agree that the game are still engaging irrespective of the duration they were using the Kahoot!. The students similarly found that the interactive and fun way of learning provided by Kahoot! increased their determination in winning the game which helped their engagement in class. Thus, Wang (2015) concluded that the duration of gamification did not affect negatively on the students' engagement. In another study, Wang and Lieberoth (2016) expanded the research by studying the effects of game elements such as audio and points in Kahoot! towards students' engagement. The result indicates that although the use of audio do have positive impact on students' interaction, the combination of both audio and points gave a much greater effect as they provide positive classroom dynamics (Wang and Lieberoth 2016). In contrast, Chaiyo and Nokham (2017) studied the effects of three different gamification tools to the students' engagement, enjoyment, concentration, perceived learning, satisfaction and motivation in lessons. They found that although all the three tools, which are Kahoot!, Quizizz and Google Form, did not show any variance on how the students perceived their learning, the students were more biased towards Kahoot! and Quizizz in comparison to Google Form as they agree that Kahoot! and Quizizz can improve their concentration, engagement, enjoyment and motivation (Chaiyo and Nokham 2017).

The research framework and model

Figure 1 shows the operational research framework proposed for this study which is divided into two phases. In the first phase, the introduction to the gamification technology was conducted at the beginning of the semester followed by the lectures intersperse by formative assessment using both online gamification platforms; Kahoot! and

Table 3 Gender frequency

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	15	30.0	30.0	30.0
Female	35	70.0	70.0	100.0
Total	50	100.0	100.0	

Quizizz throughout the semester. At the end of the semester, phase 2 commenced with students answering the questionnaire given.

A model was developed in this study to investigate the students’ acceptance towards gamification and its effects towards the students’ engagement rate during lessons. This model is designed based on the Technology Acceptance Model (TAM) with the exclusion of Behavioural Intention (BI) and Actual System Usage (U) constructs. As the implementation of the gamification during lesson was conducted by the lecturer, U of the technology which is influenced by the BI is not relevant in this context. As such, these two constructs are excluded from the proposed Gamification Acceptance Model (GAM) as shown in Fig. 2.

The model advocates that Gamification Perceived Usefulness (GPU) which is also predisposed by Gamification Ease Of Use (GEOU), together with GEOU are the two factors that are affecting the students’ attitude towards gamification. GPU can be defined as the degree to which the students’ belief in using gamification will enhance their performance in learning, whereas GEOU is denoted as the degree to which the students expects the gamification to be free of effort.

The model intimated that the attitude of students towards gamification would influence their engagement either regarding skills or participation/interaction in the lesson. Students are more prone to accept gamification if they perceived that gamification is easy to use and useful to their learning. At the same time, the students will become more engaged during lessons. Thus, increasing the knowledge gained can improve their performance in the assessments given. Educators will also adopt gamification in their

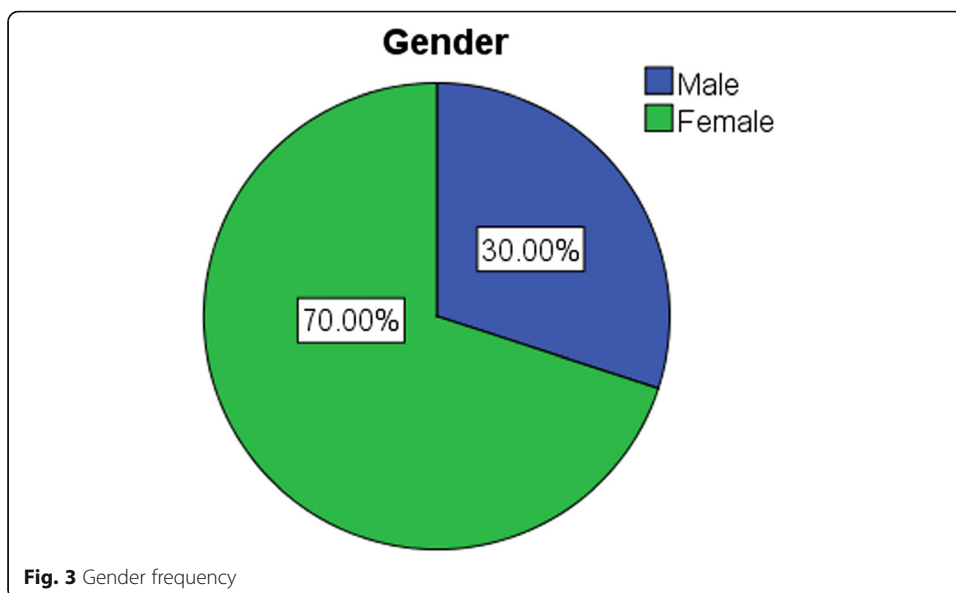


Table 4 Age frequency

	Frequency	Percent	Valid Percent	Cumulative Percent
18.00	1	2.0	2.0	2.0
19.00	48	96.0	96.0	98.0
20.00	1	2.0	2.0	100.0
Total	50	100.0	100.0	

lesson plans if they believe that students’ acceptance of gamification will increase their engagement in the lesson. As such, several hypotheses are proposed as depicted in Fig. 2:

- H1: Perceived ease of use has a positive influence on the students’ perceived usefulness of gamification in learning.
- H2a: Perceived usefulness has a positive influence on the students’ attitude towards using gamification technology in learning.
- H2b: Perceived ease of use has a positive influence on the students’ attitude towards using gamification technology in learning.
- H3a: Perceived usefulness has a positive influence on the students’ engagement.
- H3b: Perceived ease of use has a positive influence on the students’ engagement.
- H3c: Students’ attitude towards using gamification technology has a positive influence on the students’ engagement.

The empirical investigation instruments

Subjects

In this study, 50 Diploma of Information Technology (Networking) students from Information and Communication Technology Department, Polytechnic Muadzam Shah Pahang, Malaysia taking a Database Design subject were chosen as participants. The participants were students who were taught by the researcher, making the process of study easier to be conducted.

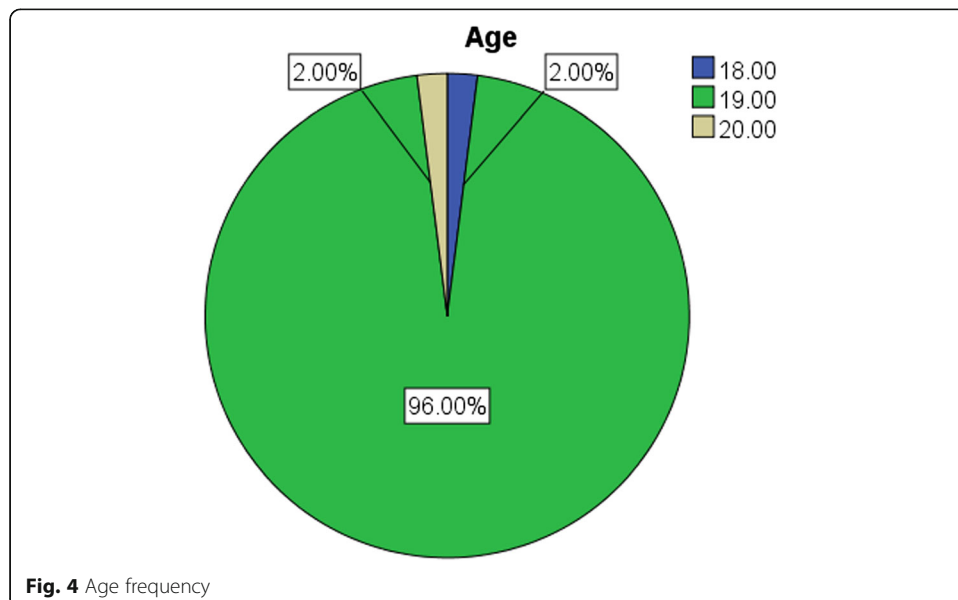


Fig. 4 Age frequency

Table 5 Cronbach alpha reliability measurement scales

Construct/Variables	Cronbach's Alpha	N of Items
Perceived Usefulness (PU)	.774	4
Perceived Ease Of Use (PEOU)	.794	4
Attitude Towards Using Gamification (A)	.738	3
Student Engagement (SE)	.797	7

Table 6 Exploratory factor analysis of measurement scales

Items	Factors				
	Perceived Ease of Use	Skill Engagement	Perceived Usefulness	Interaction Engagement	Attitude
Using the online gamification system improves my learning performance (PU1)	.194	-.251	.622	.170	.240
Using the online gamification system increases my learning outcome (PU2)	.031	-.123	.603	.099	.506
Using the online gamification system enhances my desire to produce desired result in my learning (PU3)	.154	.272	.689	.130	.053
Using the online gamification system is useful in my learning (PU4)	.141	.211	.900	.095	-.004
I find the online gamification system to be flexible to be used (PEOU1)	.726	-.026	.343	.006	.180
The online gamification functionality and interface is clear and understandable (PEOU2)	.732	.221	.366	.136	.082
Interacting with the online gamification system does not require a lot of my mental effort (PEOU3)	.741	.181	-.151	.226	.083
Overall, I believe that the online gamification system is easy to use (PEOU4)	.774	.034	.160	-.059	.203
I think that using online gamification system is a good idea (A1)	.456	.371	.115	-.097	.647
I like learning with online gamification system (A2)	.258	.191	.401	-.125	.565
I look forward to those aspects of my learning that require the use of online gamification system (A3)	.403	.163	-.038	.383	.641
Online gamification system encourage me in: Taking good notes in classroom (SE1)	-.019	.800	.130	.078	.343
Online gamification system encourage me in: Listening carefully in classroom (SE2)	.286	.818	.091	.047	.154
Online gamification system encourage me in: Making sure to study on regular basis (SE3)	.114	.812	.038	.285	-.123
Online gamification system contribute to me in: Having fun in the classroom (IE1)	.065	.001	.271	.508	.440
Online gamification system contribute to me in: Participating actively in small-group discussions (IE2)	-.053	-.034	.241	.875	.151
Online gamification system contribute to me in: Helping fellow students (IE3)	.261	.218	.140	.764	-.161
Online gamification system contribute to me in: Asking questions when I did not understand the lecturer (IE4)	.012	.454	-.106	.678	.017

Extraction Method: Principal Component Analysis
 Rotation Method: Varimax with Kaiser Normalization
 Rotation converged in 10 iterations

Table 7 Analysis for perceived usefulness

	Perceived Usefulness
Mean	4.5400
Median	5.0000
Std. Deviation	.50346
Minimum	4.00
Maximum	5.00

Data collection and procedure

At the beginning of the semester, a short introduction was given to the students regarding the use of Kahoot! and Quizizz in the classroom. This gave the students options of using their own devices (smart phones or tablets) other than the computers provided in the laboratory. Lessons were conducted based on the lesson plan. After each subtopic is completed, a pop quiz using Kahoot! was held to assess the students understanding before going to the next subtopic. At a certain interval, Quizizz were then used to assess the students and the points obtained by students contributed to 5% of their overall assessment marks. At the end of the semester, a survey was administered to the students in effort to measure students’ engagement in lessons done via gamification. This survey result helped in proposing the use of gamification in information technology course offered by Polytechnic Muadzam Shah Pahang, Malaysia.

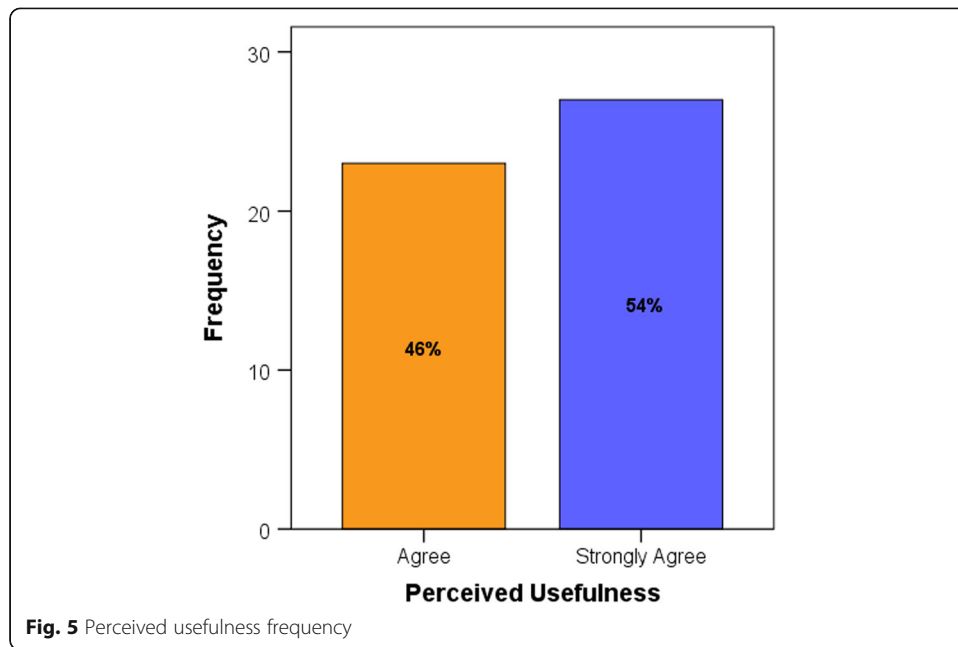
Survey instrument design

In measuring the students’ engagement based on the Gamification Acceptance Model (GAM), a survey instrument to assess students’ acceptance of gamification in their learning process based on Student Course Engagement Questionnaire (SCEQ) by Handelsman et al. (2005) and the Technology Acceptance Model (TAM) by (Davis et al. 1989) was developed as shown in Table 2. Consisting of 18 items, this survey measured students’ engagement using only two construct defined by Handelsman et al. (2005) which is the skill engagement (3 items) and participation/interaction engagement (4 items). Then, these two constructs were combined as another factor which is student engagement (total of 7 items). Items from the SCEQ are adapted in this survey and small modification is done to clarify the context of the statements to ensure students have full understanding of the items.

On the other hand, students’ acceptance of gamification was measured by two constructs which were perceived of usefulness (4 items), perceived ease of use (4 items) and attitude towards using gamification technology (3 items). Items contained in the perceived usefulness and perceived ease of use components is adapted from previous studies done to measure technology acceptance of users (Davis et al. 1989; Davis 1989; Fathema et al. 2015). All items used a 5-point Likert scale option ranged from 1 (Strongly disagree), 2

Table 8 Perceived usefulness frequency

	Frequency	Percent	Valid Percent	Cumulative Percent
Agree	23	46.0	46.0	46.0
Strongly Agree	27	54.0	54.0	100.0
Total	50	100.0	100.0	



(Disagree), 3 (Neutral), 4 (Agree), and 5 (Strongly Agree). The other 2 items covered the demographic data of the students which is the gender and age.

As this study is similar to the research done by Sawang et al. (2017) for the purpose of measuring students’ engagement after the use of certain technology, we decided to employ a descriptive statistics to describe the means, correlations, standard deviations and alphas of the variables as used in the study involving a much smaller population compared to Sawang et al. (2017).

Results and discussion

Demographic analysis

Gender and age

Demographic data collected from the respondents only comprised of 2 items which are the gender and age of the respondents. Table 3 and Fig. 3 showed the percentage of respondents based on their gender. 70% of the respondents are female students which are over twice the number of the male students. This is a common occurrence in Polytechnic Muadzam Shah as the female students’ enrolment rate is much higher than the male students especially in the Information and Communication Technology

Table 9 Analysis for perceived ease of use

	Perceived Ease of Use
Mean	4.4400
Median	5.0000
Std. Deviation	.64397
Minimum	3.00
Maximum	5.00

Table 10 Perceived ease of use frequency

	Frequency	Percent	Valid Percent	Cumulative Percent
Neutral	4	8.0	8.0	8.0
Agree	20	40.0	40.0	48.0
Strongly Agree	26	52.0	52.0	100.0
Total	50	100.0	100.0	

Department. Meanwhile, 96% of the respondents are aged 19 years old as shown in Table 4 and Fig. 4.

Analysis of reliability and validity

The reliability of the constructs used in Gamification Acceptance Model was tested using SPSS 20.0.0 based on 50 responses. Using Cronbach’s alpha to measure the internal consistency of the instrument used in this study, the result showed an acceptable values above 0.7 thresholds for all construct as shown in Table 5. This thresholds was recommended by Šerbetar and Sedler (2009). Thus, the instruments used can be said to be reliable and acceptable.

Table 6 showed the exploratory factor analysis (EFA) performed on 18 question items using SPSS 20.0 to inspect the discriminant validity of the measurement used in this study. Perceived usefulness and perceived ease of use each had 4 question items, attitude towards using gamification technology had 3 question items and student engagement had 7 question items. The EFA was also done using varimax rotation method. Eigenvalue was not chosen as factor extraction method to avoid any under or over extraction of factors which can considerably change the solution and analysis of the result as advised by Courtney (2013). Instead, a fixed number of 5 factors were chosen to be applied in this EFA.

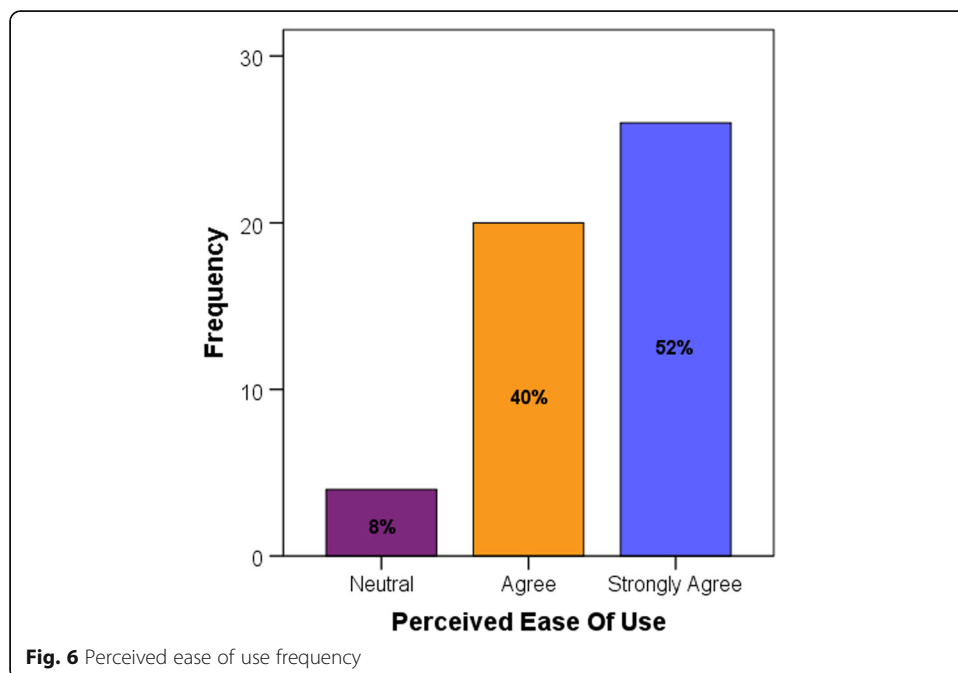


Fig. 6 Perceived ease of use frequency

Table 11 Analysis for attitude towards using gamification

	Attitude Towards Using Gamification
Mean	4.6200
Median	5.0000
Std. Deviation	.49031
Minimum	4.00
Maximum	5.00

Table 6 also shows that 18 items for all constructs had sufficient validity as the loadings of the items surpass 0.5 which is considered as acceptable by He et al. (2013). Overall, the result observed indicates the adequacy of the measurement used in this study.

An analysis

Perceived usefulness

Analysis for perceived usefulness variable in Table 7 shows that the distribution of the data was normal as the value of mean and median were close with low value of standard deviation. The mean value in Table 7 was 4.54 showed that, as a whole, the respondents strongly agree on the usefulness of the gamification technology conducted in this study.

This was shown more deeply in Table 8 and Fig. 5 where 46% of the respondents agreed on usefulness of the gamification technology and another 54% of the respondents strongly agreed that gamification technology was useful. This shows that all students agreed that using gamification technology in the classroom can benefit their learning experience.

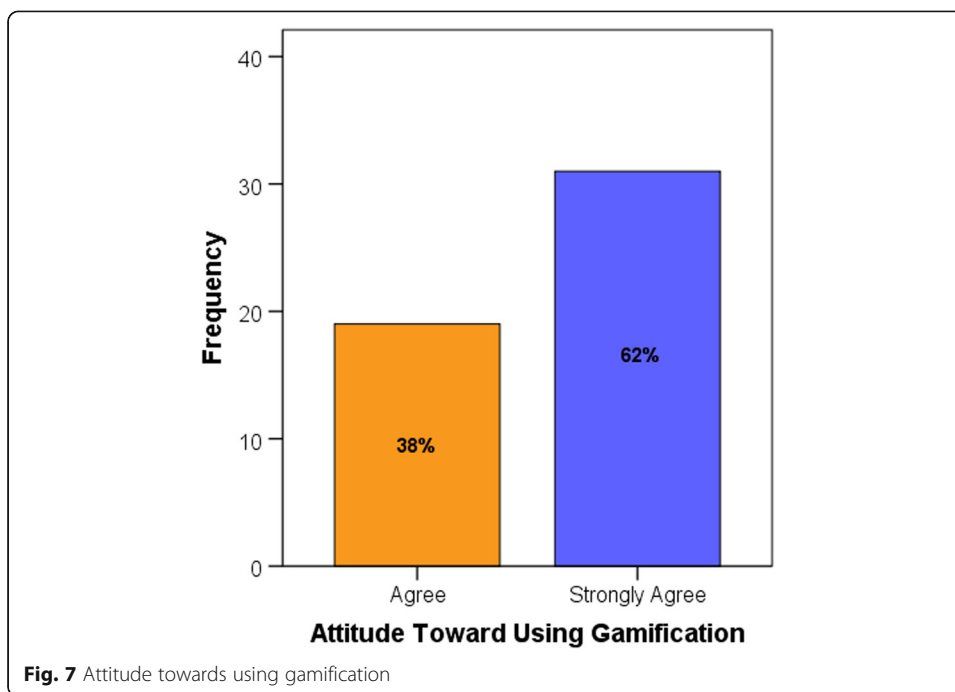
Perceived ease of use

Analysis for perceived ease of use variable in Table 9 shows that the distribution of the data was normal as the value of mean and median were close with low value of standard deviation of 0.64397 which means that the data are clustered more closely around the mean value. The mean value in Table 9 was 4.44 showing that, in overall, the respondents agree on the ease of use of the gamification technology conducted in this study.

Table 10 and Fig. 6 showed the frequencies of the respondents with 8% of them were neutral on the ease of use of the gamification technology, whereas 92% of the respondents agreed and strongly agreed that the gamification technology was easy to use. Majority of the students in this study used their own smart phone to connect to the gamification platform. As such, the situation of not having enough data for internet and slow internet connectivity may influence students’ perception on the ease of use of gamification. However, the number of cases was very low with only 8% of the respondents who did not have any opinion on the ease of use of the gamification.

Table 12 Attitude towards using gamification frequency

	Frequency	Percent	Valid Percent	Cumulative Percent
Agree	19	38.0	38.0	38.0
Strongly Agree	31	62.0	62.0	100.0
Total	50	100.0	100.0	



Attitude towards using gamification technology

Table 11 shows the analysis of respondents’ attitude towards using gamification technology. The close values of mean and median and low value of standard deviation (0.49031) shows that the data is clustered around the mean value, indicating that the distribution of data for attitude towards using gamification technology was normal. The mean value of 4.62 depicted in Table 11 points to the overall respondents’ attitude towards using gamification which is between agree and strongly agree.

Table 12 and Fig. 7 revealed that 38% of the respondents agreed on their attitude towards using gamification technology, while the other 62% respondents strongly agreed on their attitude towards using gamification technology. Students showed a very positive attitude towards the use of gamification in classroom as it brings a fresh and innovative learning environment.

Student engagement

Table 13 shows the analysis of respondents’ engagement variable. The close values of mean and median and low value of standard deviation of 0.55733 indicate that the distribution of data for respondents’ engagement when using gamification technology was

Table 13 Analysis for student engagement

	Student Engagement
Mean	4.3400
Median	4.0000
Std. Deviation	.55733
Minimum	3.00
Maximum	5.00

Table 14 Student engagement frequency

	Frequency	Percent	Valid Percent	Cumulative Percent
Neutral	2	4.0	4.0	4.0
Agree	29	58.0	58.0	62.0
Strongly Agree	19	38.0	38.0	100.0
Total	50	100.0	100.0	

normal. The standard deviation value also depicts that the data are not widely spread from the mean value showing that the data are more reliable. The mean value of 4.34 depicted in Table 13 shows that the overall respondents agreed on the engagement when using gamification technology.

According to Table 14 and Fig. 8, 4% of the respondents were neutral in regard of their engagement when using gamification technology, while 58% respondents agreed and 38% strongly agreed on their engagement in learning when using gamification technology. 96% of students feel that gamification helped them in increasing their skill engagement where they were more inclined to take notes in the classroom; prompting them to listen more carefully during lectures as it may help them in answering the quizzes conducted via gamification later on and contributing to their increase interaction in the classroom as they were more eager to ask question during lessons.

Conclusion

The study discovered that in using gamification students were more inclined to use the gamification if the technology was easy to use and thus, taking less account of the usefulness of the gamification. Perceived ease of use was also found to be a better indicator of students’ attitude towards using gamification technology as students did not have to concern themselves with the ‘know how’ of the technology on top of answering the quizzes given.

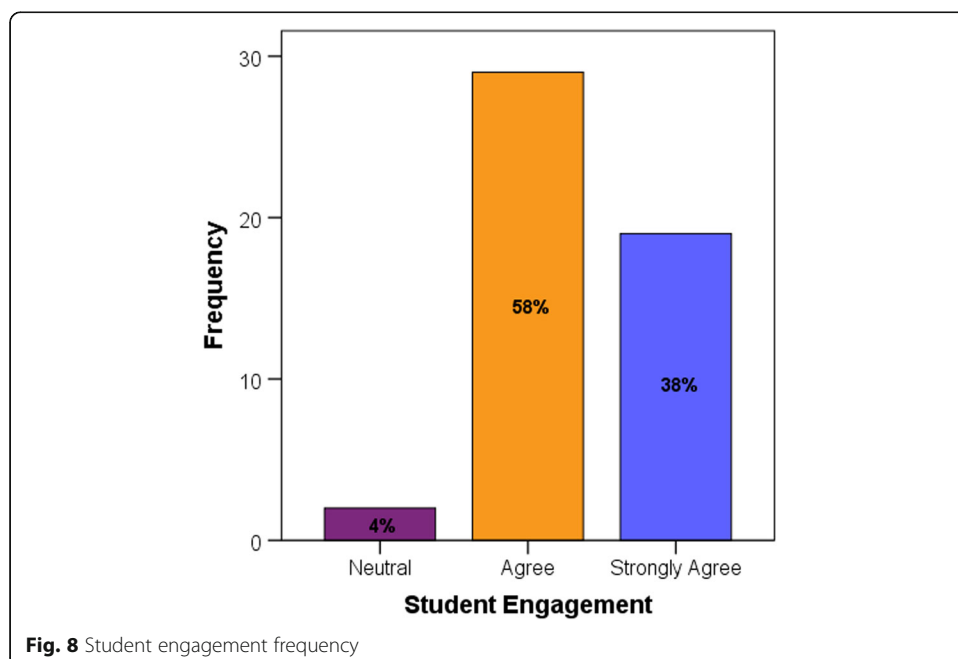


Fig. 8 Student engagement frequency

The study also revealed that students' engagement construct can be used as a gauge to measure the acceptance of students towards gamification. However, perceived ease of use, perceived usefulness and attitude towards using gamification technology constructs must be taken into account as a whole to predict student engagement. Consequently, the gamification of the learning environment must ensure that the technology selected is easy to use and able to attract the students to increase student engagement in the classroom.

Therefore, it can be concluded that Kahoot! and Quizziz as gamification platforms selected in this study are able to enhance student engagement in a classroom. These platforms can also save educators from the hassle of setting up their own gamification platform as not all educators are creative enough to gamify their own lessons. Therefore, gamification platforms such as Kahoot! and Quizziz as well as other similar platforms can be proposed as a learning tool in the classroom at Polytechnic Muadzam Shah Pahang, Malaysia.

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Availability of data and materials

Raw data is available at: https://drive.google.com/drive/folders/1_BIUgQ1Amcz_N35vJOeUVtQbPnOPZAJI?usp=sharing

Authors' contributions

RAR carried out the empirical investigation and wrote the first draft of the manuscript. SA participated in designing the empirical investigation protocol, structure and review the manuscript. URH participated in analysis of the empirical investigation results. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

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