Gamification Of Introductory Accounting Course: When Is The Best Time To Implement It

Mohamad Azmi Nias Ahmad, Norlaila Mohd Din, Junaidah Jamaluddin, Nur Syazwani Mohamad Fadzillah

Faculty of Accountancy, Universiti Teknologi MARA, Cawangan Pahang, Kampus Jengka, Malaysia
azminias@gmail.com

Faizan Abdul Jabar

Faculty of Business Management
Universiti Teknologi MARA,
Cawangan Pahang, Kampus Jengka, Malaysia

Abstract— **The aim of this study was to assess the suitable time of applying gamification as a method of teaching Introductory Financial Accounting course to non-accounting students or ACC106 at UiTM Cawangan Pahang, Kampus Raub, Malaysia. The study used the basic quantitative method, whereby data was collected via post-AOTB final exam Part B, Question Three results and then analysed. Accounting on the block's board game (AOTB) was used as gamification pedagogy for the students to prepare the financial statements. The 233 students involved in the study were diploma students in their first semester. They were divided into 2 groups an the implementation of the AOTB was carried out as early as week 2 and another 4 groups in week 10. The results indicated that students who were exposed to AOTB earlier in the course performed better than those who were exposed in the final 4 weeks of the semester. The study also shows a correlation between gamification topics with overall final examination results. Overall results also indicate a strong agreement that AOTB is a useful gamification pedagogy to enhance students' knowledge and understanding of accounting.**

Keywords— accounting; gamification; students

I. INTRODUCTION

Students' learning is assisted when they are given conditions to experience concepts in the environment of real world situation [1]. One way to improve students' motivation is to apply the concept of gamification [2]. Gamification is the process of using mechanisms or rules in the game on non-game activities with the aim of enhancing user's interactivity [3]. Gamification approach using games in teaching and learning will make the process of learning more engaging. It is in line with the Ministry of Higher Education, Dato 'Seri Idris Jusoh 2016 New Year greeting, where he anticipates that teaching and learning will be more flexible and enhanced through innovation known as gamification [4].

In conventional learning environment, the students are required to pay strict attention in class and they must also learn and master the most fundamental accounting concepts, known as the double-entry system. Unfortunately, younger generation have difficulty to focus in class due to the presence of gadgets such as mobile phone and tablet. Even worst, they tend to memorize the subject content rather than to appreciate the learning process that allows them to actively engaged and think outside the box. On the other hand, the lecturer also has limited alternatives and lack of time to spend more time on topics in the syllabus. Consequently, more time is spent on the whiteboard to show all the workings in explaining questions in the textbook. It creates a one-way communication and the learning process may become less effective.

This study focused on the gamification adoption in Introductory Accounting course for non-accounting students, namely ACC106. The aim of this study was to assess the suitable time to apply gamification as a method of teaching.

II. LITERATURE REVIEW

As mentioned earlier [3], gamification is when a lecturer is using a games mechanism or rules on non-game activity with the aim of improving student's interactivity. Earlier definition of gamification defined it as an approach to enhance knowledge retention while engaging students in learning environment [5]. The role of gamification in teaching and learning is to offer students with the flexibility to learn when they are ready [6]. This feature is suitable for the current students who prefer to construct their own learning and gather information, tools, and feedback from multiple sources [7].

Numerous studies have attempted to explain the effects of students' motivation, cognitive load and learning anxiety in gamification [2,3,4,5,6,7,8,9]. A study by Tham and Tham (2012) demonstrated that game-based learning is effective in engaging students to learn due to the element of competition, hence it eliminate the "dry" environment while learning [7].

One major drawback of this approach is that some educators perceived it as time wasting and ineffective [10,11]. However, the most important of these two studies failed to note is, as it was found in another study, that gamification improved students' performance significantly because of the interaction during the process of learning [12].

Moncada & Moncada (2014) suggested that the characteristics of well-designed gamification activities should have these items:-

- Include educational objectives and clear learning outcomes.

- Identify prerequisite skills required for the activity.

- Offer a challenge and a sense of mastery through winning.

- Provide a safe environment for failing.

- Use pleasing colour schemes.

- Employ a clutter-free layout.

- Include clear and concise instructions.

- Have simple, easy-to-understand rules of the game play.

- Provide relevant feedback or rewards to participants.

- Include accurate and relevant content.

- Foster engagement through interactivity

One question that needs to be asked, however, is when is the best time to implement gamification? Therefore, these hypotheses are developed.

H1: Students who were exposed to AOTB earlier in the course performed better

H2: There is a significant difference in score between students who were exposed to AOTB earlier and later in the semester

III. RESEARCH METHODOLOGY

The students were divided into 2 groups; with one implemented AOTB as early as week 2 and another 4 groups in week 10. "Accounting on the Block" (AOTB) which consists of a board game and a card game used in this study. All students were enrolled in "Introduction to Final Accounting and Reporting" or ACC106.

The data was collected via post-AOTB final exam Part B, Question Three, results which relates to the preparation of financial statements of a sole trader for merchandising and service enterprise.

Prior to conducting the formal statistical analyses, preliminary steps to ensure the quality of data were conducted to ensure it is worthy for further analysis [13]. Firstly, a four-step-process to identify missing data [14] was conducted. Step one is to determine the type of missing data. It was found that the missing data was not caused by the research design but it was due to zero score. Therefore the extent of missing data is not substantial enough to warrant any action.

Next, the test of normality was performed. Although Kolmogorov-Smirnov statistics indicated that all variables are significant hence non-normal, test of normality is sensitive and "often signal departures from normality that do not really matter (p.46)" [13]. To make sure that the data is approximately normal, the study identified outliers using boxplot. Both data (early and later) was skewed to the right with the z-scores of -2.98 and -.47 respectively.

This is indicative of non-normality and it can be concluded that the assumption of normality to conduct a t-test for either group of scores is violated. This was later confirmed through visual indicator of normal Q-Q plot. The transformation of the data was then conducted using both log10 and square-root method. Hence, the transformation of log10 has corrected the non-normal data distribution.

IV. RESULTS

A total of 233 students were involved in this study, with 118 students exposed to AOTB earlier and 115 students exposed to AOTB later in the semester. Table 1 shows the central tendency and variability scores for this study

TABLE I.   DESCRIPTIVE

	Early	**Later**
N	118	115
Mean	23.091	20.027
Median	22.8	21.4
Standard Deviation	6.68624	6.89286
Range	32.44	31.18
Minimum	6.80	4.06
Maximum	33	33

Looking at the values of mean, with median, standard deviation and maximum in Table 1, then are almost similar with one another. Thus, it can be concluded that early adoption score better marks, with mean of 23 marks, compare to 20 marks for adoption of AOTB later in the semester. Therefore, H1 was supported.

In table 2, Kolmogorov-Smirnov tests was used to assess normality since the sample was quite big and it was used in conjunction with graphical methods. Both Kolmogorov-Smirnov tests are statistically non-significant at $\alpha = .05$, confirming that the normality assumption is not violated.

TABLE II.   TEST FOR NORMALITY

	Adopt	**Kolmogorov-Smirnov[a]**		
		Statistic	*df*	*sig*
Score	Early	.050	118	.200[*]
	Later	.051	115	.200[*]

a.   *. This is a lower bound of the true significance
b.   a. Lilliefors Significance Correction

Next, in Table III, the Levene's Test for Equality of Variance is not significant (F=0.15, Sig >.05) for scores. Therefore, the assumptions of homogeneity of variance have not been violated, hence the interpretation and report of the t-test for equal variances is assumed.

TABLE III.   LEVENE'S TEST FOR EQUALITY OF VARIANCES

	F	**Sig**
Score	0.15	.903

Table IV shows the t-test for Equal variance assumed and it is not statistically significant at α = .46. This study, therefore, can reject the null hypothesis, and it is save to conclude that there is a significant difference in the score between students who were exposed to AOTB earlier and later in the semester. Hence, H2 is supported.

TABLE IV. INDEPENDENT SAMPLES T-TEST BETWEEN MEAN SCORES OF STUDENTS WHO WERE EXPOSED TO AOTB EARLIER AND LATER

M(SD)		Independent sample t-test (DF=231)	95% Confidence Interval	
Early N=118	*Later N=115*		*Lower*	*Upper*
23.09 (6.69)	21.31 (6.89)	2.002	.02797	3.53349

V. CONCLUSION

This study examined students' performance for Part B, Question Three. The question was on the preparation of financial statements. The students were taught using AOTB board game and card game. Based on the results, it clearly shows that students' who been taught earlier using gamification technique scored better compared to students who used it later in the semester. This finding provides empirical evidence that gamification pedagogy should be implemented as early as possible.

It is recommended that the games are played in the first week during the semester. Emphasis should be on playing the AOTB card game with the aim of strengthening students' basic understanding of debit and credit. Once students' basic understanding of accounting is adequate, they can proceed with the board games followed by conventional teaching.

In terms of limitations, the study examined only score as a measurement. There are many other variables that can influence the students' performance, such as exposure of principal of accounts in secondary school, burdens of work during final months before exams and courses taken. One interesting fact about the finding is that students who used AOTB later in the semester have a bimodal distribution. This phenomenon should be examined because it might be associated with students' previous exposure to accounting. Therefore, future studies should look at this context to find how they interact and affect students' performance.

REFERENCES

[1] Holcomb, T., & Michaelsen, R. (1996). A strategic plan for educational technology in accounting. *Journal of Accounting Education, 14*(3), 277-292.

[2] Handani, S. W., Suyanto, M., & Sofyan, A. F. (2016). Penerapan konsep gamifikasi pada e-learning untuk pembelajaran animasi 3 dimensi. *Jurnal Telematika, 9*(1).

[3] Domínguez, A., Saenz-de-Navarrete, J., de-Marcos, L., Fernández-Sanz, L., Pagés, C., & Martínez-Herráiz, J.-J. (2013). Gamifying learning experiences: Practical implications and outcomes. *Computers & Education, 63*(9), 380-392.

[4] Jusoh, I. (2016). *Ucapan YB Menteri Pendidikan Tinggi, Amant Tahun Baharu 2016*. Putrajaya: Ministry of Higher Education Retrieved from https://www.mohe.gov.my/en/mediakpt/speech-text/81-teks-ucapan-amanat-tahun-baharu-2016-yb-menteri-pendidikan-tinggi.

[5] Randel, J. M., Morris, B. A., Wetzel, C. D., & Whitehill, B. V. (1992). The effectiveness of games for educational purposes: A review of recent research. *Simulation and Gaming, 23*, 261-276.

[6] Kapp, K. (2012). The gamification of learning and instruction: game-based methods and strategies for training and education. San Francisco, CA: Pfeifler.

[7] Tham, L., & Tham, R. (2012). Is Game-Based Learning an Effective Instructional Strategy to Engage Students in Higher Education in Singapore? A Pilot Study. *Journal of the Research Center for Educational Technology (RCET), 8*(1), 2-10.

[8] Su, C.-H. (2016). The effects of students' motivation, cognitive load and learning anxiety in gamification software engineering education: a structural equation modeling study. *Multimedia Tools and Applications, 75*(16), 10013-10036.

[9] Banfield, J., & Wilkerson, B. (2014). Increasing Student Intrinsic Motivation and Self-Efficacy through Gamification Pedagogy. *Contemporary Issues in Education Research, 7*(4), 291-298.

[10] Hassan, R., & Poopak, M. (2012). The effect of card games and computer games on learning of chemistry concepts. *Procedia-Social and Behavioural sciences, 31*, 597-601.

[11] Moncada, S. M., & Moncada, T. P. (2014). Gamification of learning in accounting education. *Journal of Higher Education Theoryand PRactice, 14*(3), 9-19.

[12] Virvou, M., Katsionis, G., & Manos, K. (2005). Combining Software Games with Education: Evaluation of its Educational Effectiveness. *Educational Technology & Society, 8*(2), 54-65.

[13] Sekaran, U. (2003). Research methods for business: a skill-building approach. New York, Wiley.

[14] Hair, J. F. (2006). Multivariate data analysis. Upper Saddle River, N.J, Pearson Prentice Hall.