Interactive Kahoot! - An Application to Enhance the Learning of Accounting Subject in School

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Abstract: This study was conducted to examine the effect of using Kahoot! on students’ achievement of their accounting subject. The accounting subject is viewed as a difficult subject and was often dislike by many students. Therefore, this study hopes to provide evidence on a tool that may attract students to learn accounting subject known as Kahoot!. The study used a pre-experimental case study research design with explanatory sequential mixed method. A sample of 22 Malaysian students aged 16 years was selected from a school in northern Peninsular Malaysia. The instrument used was a pre-test and post-test which contained 30 multiple choice items. The Kuder-Richardson reliability value (KR20) is .85. The t-test result shows that there is a significant difference between the pre- and post-test accounting subject achievement scores of the students. Interviews indicates that the students enjoyed learning using Kahoot! and it helps them to be more engaged with the subject.

Keywords: Accounting, Kahoot!, game based learning, pre-experimental research design, online quiz

1. Introduction

Education is a basic requirement that must be given to all human beings. UNESCO (2020) says that a balanced education will help people to improve their standard of living. According to Bhardwaj (2016), “Education is a must”, which means without education, the life of a human being is futile. Furthermore, education not only enriches one’s life with knowledge but is very important for improving social relationships, character formation and self-esteem. Bhardwaj (2016) define education as a continuous learning, through which human beings learn through experience, failing and succeeding, as well as from people in their surroundings.

Since years 2000, traditional teaching and learning methods which emphasize on face to face interaction in class has been shifted in the modern digital based methods. The current pandemic of Covid-19 has accelerated the process to shift face to face method to game based and online method (Sathish, Thangajesu, Sornaganesh, Sudha&Chellama, 2020). The advancement of information and communication technology (ICT) is changing the dynamic of education from various aspects such as the access to educational resources, methodology and connection with students. ICT is gaining popularity among educators in Malaysia as it helps educators to process, manage, store and disseminate educational materials through the application of technology. Many interactive and communication technology applications are available and one of them is the Web 2.0 application.

The Impact of the Web 2.0 Tool in Education

The Web 2.0 applications is more focused on education, research and innovative pedagogical tools [3]. It is a social network that is preferred by students and educators because it is in line with state-of-the-art technology that allows the sharing of information and ideas more effectively. Examples of the Web 2.0 applications are the Blendspace, Tumblr, Edmodo, Kahoot! and others Bugawa and Mirzal (2018). Kahoot! is a game-based learning platform used to review students' knowledge and understanding, conducting formative assessment or used as a "time-out" of traditional classroom learning activities. Since the launch of this application in 2013, many studies have been conducted to identify the effects of using Kahoot! application in a classroom (Licorish, Owen, Daniel & George, 2018). According to Plump and LaRosa (2017) in their study on the use of Kahoot! for 139 undergraduate and post graduate students, overall, there was an 88.7% positive response rate, 2.2% of the students did not provide any answer and 9.1% reported negative comments. Among the negative responses were: “It was difficult to stay motivated once I got a couple questions wrong because I could not win the game,” “The same students won each time, which wasn’t fun for the rest of us,” “It was stressful because I had to read the question and answer it so quickly I didn’t have time to think,” and “It seemed a little gimmicky.”

Review of Literature
Gamification

Gamification is the practice of applying game fundamentals in a non-game environment (Deterding, Dixon, Khaled & Nacke, 2011) to transform them into game-like activities. It can be implemented in various contexts, such as in commerce, service marketing and customer engagement (Huotari and Hamari, 2017; Hamari, 2017); healthcare (Jones, Madden & Wengreen, 2014; Hamari and Koivisto, 2017); and education (Yildirim, 2017; Wronowski et al., 2020), to better engage people. In education, gamification refers to the conversion of game design into a process of learning with the aim of growing students’ attention and inspiration, increasing their achievement and improving their attitude toward the teaching and learning process (Yildirim, 2017).

Gamification is beneficial for education as it offers another approach to teaching and learning. A review of related literature found that gamification helps to develop student engagement and motivation to learn in the classroom (Wronowski et al., 2020; Rapti, 2013). Additionally, previous study also found that students’ conceptual knowledge increases when they play academic or education-related games (Wronowski et al., 2020).

Playing educational games, whether a simple or complex games, create a more enjoyable and engaging teaching and learning setting, without compromising the key learning objectives. (Rahman, Ismail, Noor & Salleh, 2018) stated that gamification has positive effect on the students’ learning processes. Learning through the gamification method has been proved to increase students’ interest, perseverance and thinking skills (Roshi, Khairudin & Saat, 2019). It also foster fun learning environment, increase social involvement and nurture positive values among the students as they play the game (Rahman et al., 2018). This study focused on the use of gamification through Kahoot! to teach accounting for a group of secondary school students.

Gamification in accounting

In teaching accounting subject, teachers need to deliver the accounting concepts and technical calculation in a way that can be well understood by the students. This is important so that ultimately, students will be able to apply the knowledge learnt when handling transactions, record-keeping and problem solving. However, if students feel that learning the accounting subject is boring and find it hard to understand accounting concepts and acquire critical thinking skills Jaijairam, (2012), it would be difficult for them to grasp what is being taught and discuss the application of accounting in business transactions. Evidence shows that some accounting students struggle to understand the theoretical concepts of accounting and get low marks in examinations (Khanna, 2017). Thus, accounting teachers need to find innovative teaching approaches to enhance the learning process. In this regard, gamification is one of the teaching methods that can be applied to create an interesting and invigorating teaching and learning environment for the accounting subject.

Previous studies have shown that gamification can also be applied to encourage active teaching and learning of accounting, be it with the use of technology or non-digital tools, such as board games. Studies on the impact of games in accounting class indicated that students are more motivated, and show greater enthusiasm and interest in learning the course (Roshi et al., 2019; Fratto, 2013 and Nitkin, 2012). It was revealed that educational games stimulate collaborative interaction among the students during the accounting learning process (Shah, 2017; Moncada and Moncada, 2014). Although developing educational games in accounting can be challenging and time consuming for accounting educators to prepare and develop, well-structured and designed gamification activities can offer a more engaging and effective alternative to the ‘boredom” in the teaching and learning process of the accounting subject as complaint by students (Moncada and Moncada, 2014).

Game-based learning

Game-based learning is defined as, “a type of game played with defined learning outcomes” (Shaffer, Squire, Halverson & Gee, 2005). The game-based learning theory suggests that games can achieve the potential of learning if different theoretical foundations of learning, such as cognitive, affective, motivational, and sociocultural foundations, are taken into account. Many researchers have argued why games can create an effective learning environment. Among them are the motivational aspects of the games which can motivate learners to stay engaged over longer periods; the different features of the games which can be customized or personalized avail various ways to engage the learners (Plass, Homer & Kinzer, 2015).

Kahoot! – A game-based tool

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Several studies have been conducted to investigate the impact of gamification on students’ performance. One of the popular digital gamification tools is Kahoot!. An exploratory qualitative study by (Gómez and Monroy, 2018) investigated the skills of the Public Accountant. This study, which interviewed the students who took Accounting II, Public Accounting, Finance and Public Budget courses in the second semester of 2017, found that majority of the respondents valued positively the application of the gamification strategy, especially the use of the Kahoot! tool.

Studies on the impact of Kahoot! on students’ academic and non-academic performance have been conducted at the higher learning levels, such as at university and college levels. For example, Tóth, Lógó & Lógó (2019) investigated the long-term learning effects of the Kahoot! quiz in exams. Data were collected from 200 undergraduate students of an elective course. The results show that students who took part in more Kahoot! quizzes tend to get higher exam marks compared to those who did not. Therefore, they concluded that using game-based learning has a positive effect on the students’ results and perception of learning.

Various studies have also been conducted on the effects of gamification tools, such as Kahoot! on non-academic performance, to see whether or not there is an increase in motivation, engagement and decision-making skills. For instance, Ismail et al., (2019) conducted a qualitative study via focus group discussions with medical students. A total of 36 categories and nine sub-themes emerged from the focus group discussions. These categories and sub-themes were then grouped into three main themes, namely, attractive learning tool, learning guidance and source of motivation. Their results suggest that Kahoot! sessions motivate students not only to study but also to determine the subject matter and be aware of what they have learned. Therefore, they concluded that Kahoot! is a promising tool for formative assessment in medical education.

Ismail et al., (2018) conducted a study to identify students’ attitude and motivation to and perception of gamification through Kahoot! usage among 20 third-year college students in the Machining Industry Programme. A questionnaire was used to collect the data and SPSS package was used to analyse the data. The study found that gamification using Kahoot! is well received and has a positive effect on students’ attitude, motivation and perception. This indicates that gamification via the Kahoot! platform is a well-accepted concept.

In terms of using Kahoot! to increase engagement, Cameron and Bizo (2019) conducted a quantitative study among 72 students to identify their experiences with Kahoot!”. The results show that implementing Kahoot! did not directly increase achievement. However, there is positive social learning as it provided a fun, competitive and impactful end to a class, which are important aspects for maintaining a level of achievement in education.

Other gamification tools have also been studied and have been found to be suitable for increasing students’ performance and motivation. For example, Zhao (2019)investigated the effectiveness of the Quizizz application among accounting students, and found that this app has a positive impact on their learning experiences. In another study, Hidayati, Zubaidah, Suarsini & Praherdhiono (2019) examined students’ critical thinking skills by using Problem-based Learning (PBL) and Digital Mind Maps (DMM); while Nkhoma, Nkhoma, Thomas, Tu & Le (2018) conducted a study on flipped classroom approach as an alternative to Kahoot!.

Research Questions

Based on the previous literature and the current teaching and learning advancement in education, this study seeks to answer the following questions:

a. What is the achievement level for pre-test and post-test scores for the accounting subject?

b. Is there any significant difference between pre-test and post-test scores after learning the accounting subject using Kahoot!?

c. What is the students’ perception of using Kahoot! to study the accounting subject?

Hypothesis

To answer research question (a) and (b), the main hypotheses of the study is:

H0: There is no significant treatment effect (learning accounting using Kahoot!) on the students’ post-test score.

Research question (b) was answered via the data collected from focus group interview.

2. Methods
This methodology section discusses the following:

**Research Design**

The purpose of this study is to see the effect of using Kahoot! to improve the achievement of a group of Form Four students (age 16 years) for the accounting subject in a religious school in Malaysia. A pre-experimental one group pre-test-post-test research design was used which involved a total of 22 students. Explanatory sequential mixed method design was used in the data collection and data interpretation processes (Creswell and Creswell, 2018). Through this method, quantitative data were collected though pre- and post-tests while qualitative study data were collected through focus group interview sessions.

**Sampling Design**

A non-probability sampling or a type of purposive sampling on 22 samples from one class in one school was used. Ten of them were interviewed to gain an understanding of their views concerning learning activities using Kahoot!. The sample comprised n=10 males and n=12 females.

**Data Collection Procedure**

In the first week, a total of 22 students were given a pre-test, while in the second week, all students were given treatment through learning using Kahoot! for six weeks. In the eighth week, the students were given a post-test (Creswell and Creswell, 2018). A collaborative learning session using Kahoot! was conducted in each of the six-week learning sessions involving topics, such as accounting equation, journal, ledger, trial balance, financial statement, etc. In the eighth week, a focus group face-to-face interview was conducted on 10 randomly selected students which took 15 to 20 minutes for each sample.

**Research Instrument**

The research instrument involved pre-test and post-test for quantitative data collection; while the interview protocol was developed by the researcher to obtain qualitative data. A pilot test was conducted on 60 (16-year-old) students who were not involved in this study but had a similar background as the study sample, such as age and class level (Form Four). In fact, the pilot test was conducted on students studying the accounting subject in other schools. A reliability test analysis was conducted through the Kuder-Richardson (KR-20) test for 30 multiple choice test items and the reliability value obtained was .86. According to Creswell and Creswell (2018), reliability value that exceeds .80 is excellent and acceptable for an actual study. The validity process of the pre- and post-test instrument was carried out by appointing six experts, consisting of curriculum and instruction, assessment and evaluation in education and psychometric lecturers, and two secondary school subject matter expert teachers. Face validity and content validity were conducted by all six experts and accordingly, improvements were included, specifically regarding sentence structure to make it clearer and more precise. After all interview protocols had been validated in terms of face validity and content validity, they were adopted for the actual study.

**Data Analysis**

Data analysis involved the use of paired sample t-test to identify differences in the pre- and post-test scores (Creswell and Creswell, 2018) after treatment (learning using Kahoot!) had been conducted for six weeks during the Form 4 accounting subject learning session. For descriptive data analysis, students' scores in pre- and post-tests were ranked according to four levels as shown in Table 1.

<table>
<thead>
<tr>
<th>Table 1. Level of scores</th>
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<tr>
<td>Scores</td>
</tr>
<tr>
<td>71-100</td>
</tr>
<tr>
<td>65-70</td>
</tr>
<tr>
<td>55-64</td>
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</tbody>
</table>
3. Results

Quantitative Findings

The following are the quantitative findings to answer the first and second research questions.

![Figure 1. Pre-test and Post-test Scores](image)

Figure 1 shows the descriptive data of students’ achievement scores for the accounting subject. Findings show that post-test scores have improved significantly compared to the pre-test scores. The pre-test score shows that most of the students, i.e., 82% (n = 18) obtained a low level; while the remaining 18% (n = 4) obtained average level. However, the findings of the post-test score show that the majority of students, i.e., 64% (n = 14) obtained a low level; while 27% (n = 6) obtained a moderate level and the rest obtained a high level at 9% (n = 2).

A paired sample t-test was conducted to evaluate the effectiveness of Kahoot! among pre-test and post-test Form 4 students for the accounting subject. Based on Table 2, the paired sample t-test is significant (t=−2.936, df=21, P < 0.05). The result therefore rejects H₀ and accepts H₁. Thus, there are significant differences in using Kahoot! in learning the accounting subject. Students learning accounting using Kahoot! scored higher compared to students learning accounting without using Kahoot! (mean=50.68 for using Kahoot! and 47.00 before using Kahoot!).

<table>
<thead>
<tr>
<th>Accounting Test</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>df</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
<td>22</td>
<td>47.00</td>
<td>6.583</td>
<td>21</td>
<td>-2.936</td>
<td>.00</td>
</tr>
<tr>
<td>Post-test</td>
<td>22</td>
<td>50.68</td>
<td>8.150</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Qualitative Findings

Interviews were conducted to explore the students’ perception of using Kahoot! when learning the accounting subject. Generally, most of the students who were interviewed liked using Kahoot!. They became more engaged in class as they had to do a test at the end of the class. As a result, the students tried their best to gain a better understanding of the subject as the Kahoot! multiple choice and short answer questions require them to understand all the class sessions to be able to answer the questions. Below are several quotes from the interview:

“I enjoy the Kahoot! session...”
“Like Kahoot! session....”
“Kahoot! session makes the class lively, especially with the reward...”
“Kahoot! session helps us to improve our understanding through the multiple choice questions....”
“the online Kahoot! quiz makes me alert...”
“when we play Kahoot!, I realize which part of the subject that I understand and not understand during the class, this helps me to focus when I am doing revision...”
“...in every session, I am waiting for the Kahoot! session....”

4. Discussion and Conclusions

The accounting subject is perceived as a difficult subject by many students, especially the Malay students in Malaysia. Consequently, these students are not attracted to learn accounting and choose it as their future career. Additionally, those who take it, they may not be able to focus in class as the complexity of this subject might prevent them from getting a good score. With the aim of identifying the effects of using Kahoot! to improve the accounting subject achievement score, the findings of this study proves the significant improvement in scores compared to the pre-test scores. In contrast to the hypothesis that there is no significant effect of learning accounting using Kahoot! on the students’ post-test score, the result proves otherwise. This indicates that interactive tools, such as Kahoot!, assist students in their learning process, consequently improving their scores.

The result is consistent with the previous quantitative findings by Tóth et al., (2019), where the students who took part in more Kahoot! quizzes obtained higher exam marks compared to those who did not. The result is also in line with Cameron and Bizo (2019), who suggested Kahoot! makes the learning process more fun and competitive, two important aspects needed for maintaining a level of educational achievement.

Similarly, the qualitative results are in tandem with the quantitative findings, where it is found that most students enjoyed using Kahoot! to facilitate their learning process; students found their understanding is enhanced with the use of this interactive tool. The findings are consistent with Wronowski et al. (2020) and Rapti (2013), in that most of the students engage better in class and Kahoot! sessions make the class livelier.

Teaching the accounting subject to students could be daunting as fundamental concepts need to be delivered clearly for students to understand and to identify and record transactions in the right way. If the learning environment is not attractive for students, they will struggle to obtain good scores for this subject. Thus, an innovative teaching approach should be considered and this study has proven that the inclusion of gamification or interactive tools can enhance the learning process, subsequently increasing students’ performance.

The findings of this study should be taken into account when considering how to plan and design teaching methods for such subjects in schools. Critical subjects, like accounting, should not be taken lightly and approaches to make it more interesting and less worrisome for students must be identified. This study empirically proves that an intervention using gamification helps to create more fun and enjoyable classroom environment for students that improve their learning experience and understanding of the subject.

However, the findings of this study are limited in its generalizability due to the small sample size comprising a specific group of students. Therefore, one should be cautious in making a generalization from the findings of this study. Nonetheless, the findings do answer the research questions.

5. Conclusion

This research examined the effects of using the Web 2.0 tool, Kahoot!, on the score achievement for the accounting subject among secondary school students. Based on both quantitative and qualitative analyses, it can be concluded that the use of interactive tools in the teaching and learning process, is an important consideration when designing and planning teaching methods. The results indicate that students are more receptive to learning with the help of interactive tools and the element of fun helps to increase their motivation to study as well as their performance. Even though the accounting subject is not a preferred subject among most Malay students, positive and significant changes occurred with the inclusion of this tool during the learning process. Although generalizability of the results is limited due to the specific sample of this study, it does provide new insights into how critical subjects, such as accounting could be innovatively improved to achieve better end results for students.

Based on this conclusion, the Ministry of Education (MOE) should acknowledge the importance of gamification elements to enhance the learning process. Teachers also need to be innovative in making the accounting subject class more interesting as well as other subjects which are perceived as extremely difficult by students.
To better understand the implications of these results, future studies could use a bigger sample, test other critical subjects and use a different scope. Perhaps, this could lead to a better understanding of students’ behavioral intention towards teaching and learning.

Overall, this study answers the research questions and confirms the arguments of game-based learning that interactive tools can help to achieve the potential of learning since the motivational aspects of the games can inspire students to stay engaged during the learning process, consequently increasing their level of understanding. This in turn, will impact positively on their achievement.

6. Acknowledgement

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