ENHANCEMENT OF PERFORMANCE AND MOTIVATION THROUGH APPLICATION OF DIGITAL GAMES IN AN ENGLISH LANGUAGE CLASS

by **Saovapa Wichadee***
Language Institute, Bangkok University
Bangkok, Thailand
saovapa.w @ bu.ac.th
and **Fasawang Pattanapichet**
Bangkok University International, Bangkok University
Bangkok, Thailand
fasawang.p @ bu.ac.th

Abstract
The study was conducted to find out what impact a digital game had on students' learning performance and motivation. A quasi-experimental study was performed with two groups of students. The experimental group was taught using the digital game *Kahoot* whereas the control group was taught with the conventional method. Pre-tests, post-tests, and questionnaires on the students' motivation and attitudes toward gamification in language learning were the instruments used in this study. The data were analyzed using Independent t-tests and One-way Analysis of Covariance. The results revealed statistically significant differences with regard to learning performance and motivation at 0.05. The experimental group obtained higher scores than the control group, and the motivation of students in the experimental group was much higher than that of the control group. In addition, the results of a survey indicated that students had positive attitudes towards application of digital games in language learning.
Keywords: gamification; *Kahoot*; digital games; language learning; motivation

1. Introduction and background

Application of games for educational purposes has been observed for many years with an aim to increase students' motivation, which is an important, pervasive determinant of learning behavior (Schunk, Meece, & Pintrich, 2013). That is, a game-based learning context helps to shape a higher level of motivation of an individual (Ebrahimzadeh & Alavi, 2017). Games have a significant role to play to change a traditional teacher-centered classroom to learner-centered classroom. The use of games in class provides the students with an exciting learning

experience (Icard, 2014). Accumulating points and getting a sense of competition-driven systems such as competing for prize and ranking are typical features in gamification (Burke, 2014). Therefore, students become attentive because games make their learning more enjoyable (Chou, 2015).

However, the use of traditional games in class is decreasing because technology can create more interesting games which suit learners' lifestyle. Online or digital games in the instructional process is more relevant for students who can download applications to play through mobile phones. One benefit of digital games is to stimulate learning. Students can perceive the element of confrontation, gain a sense of accomplishment or loss, and receive instant feedback (Kapp, 2012). Cassady and Johnson (2002) pointed out that feedback is pivotal concerning evaluation. Given instant and pertinent feedback, learners are more likely to integrate the feedback into what they have studied and revise the learned content.

Apart from influencing the processes of learning and understanding, digital games are concerned with mental and social conditions (Lee & Hammer, 2011). When students' motivation to learn increases, they are more likely to come to class. This concept is supported by Dörnyei and Ushioda (2011), who found that motivation is closely related to participation. In addition, digital games can create a good learning environment and promote user engagement (Goehle, 2013). According to Reeve (2012), engagement refers to the degree to which a learner exhibits his/her dynamic participation, attentiveness, enthusiasm when he/she becomes involved in the process of learning, which can contribute to satisfying learning performance. On the other hand, lack of engagement can hinder the effectiveness of learning (Heaslip, Donovan, & Cullen, 2014). In conclusion, digital games can be used as an effective tool to motivate learners, enhance their enthusiasm, increase and check their comprehension (Kim, 2015; Simões, Diaz Redondo, & Fernández Vilas, 2013).

Currently, many digital games are applied in classrooms at all educational levels, and *Kahoot* is one of the best-known games used by instructors in Thailand. The *Kahoot* application is easily accessible via smartphones or PCs. Once instructors create their account, they can either formulate questions or quizzes or they may borrow those already created by others. *Kahoot* was first introduced to all teaching staff at the Language Institute in a technology-related workshop after the university had launched a policy of technology integration into learning. Later, *Kahoot* was embedded in a fundamental English course to reinforce certain behaviors such as attention and engagement of the first-year students. It was noticed that *Kahoot* made learning more enjoyable through competition. This year, *Kahoot* was used in the course taken by the second-year students.

The current study aimed to investigate the effects of *Kahoot* on students' performance and motivation. The performance focused on their learning development in grammar and vocabulary knowledge while motivation demonstrated enthusiasm in learning. In addition, their attitudes towards application of digital games were examined to gain more details. It is hoped that the results will provide insights into the use of *Kahoot* in language learning.

2. Literature review

2.1. Gamification and the theory of gamified learning

According to Deterding (2011, p. 1), incorporating games in other activities apart from non-game settings to boost engagement and motivation of the participants is defined as "gamification". In this regard, games are also applied in the field of education to facilitate learning and adjust students' behavior. Since the kind of engagement that students experience with games is based on an educational context, their knowledge increases. Gamification in education offers many benefits such as increased fun, more relaxed atmosphere, more visible learning progress, and greater ownership of learning (Leaning, 2015). According to the theory of gamified learning, two major psychological processes in which games can affect learning include a more direct mediating process and a less direct moderating process (Landers, 2015). Since learning occurs through an intermediary attitude or behavior, games should be designed to vary in context. For example, the use of more specific rules or goals in games can raise motivation to learn (an attitude) while learner cognitive strategies (behavior) will be enhanced by adaptation of a game to learner ability (Wilson *et al.*, 2009)

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2.2. *Kahoot*: digital game in the 21st century

Digital games have already taken place of traditional ones due to the significant role of technology in language education. Among those, *Kahoot* is an example of a popular game-based Classroom Response System (Fies & Marshall, 2006). Introduced in 2013, *Kahoot* has become a well-known online game used by instructors as an intriguing tool to check learners' knowledge and increase their involvement in learning. *Kahoot* adopts gamification as a way to motivate and involve learners. With the application of *Kahoot*, an otherwise sleepy, insipid class can turn into an active and highly charged group of students eager to absorb and excel (Thomas, 2014). It can increase students' enthusiasm and motivation to learn. In terms of quizzes, *Kahoot*'s gamification makes it fun for learners attempting to get the answers right

so that their names show on the leader board. Ever since it was first introduced, *Kahoot* has benefited classes of different levels.

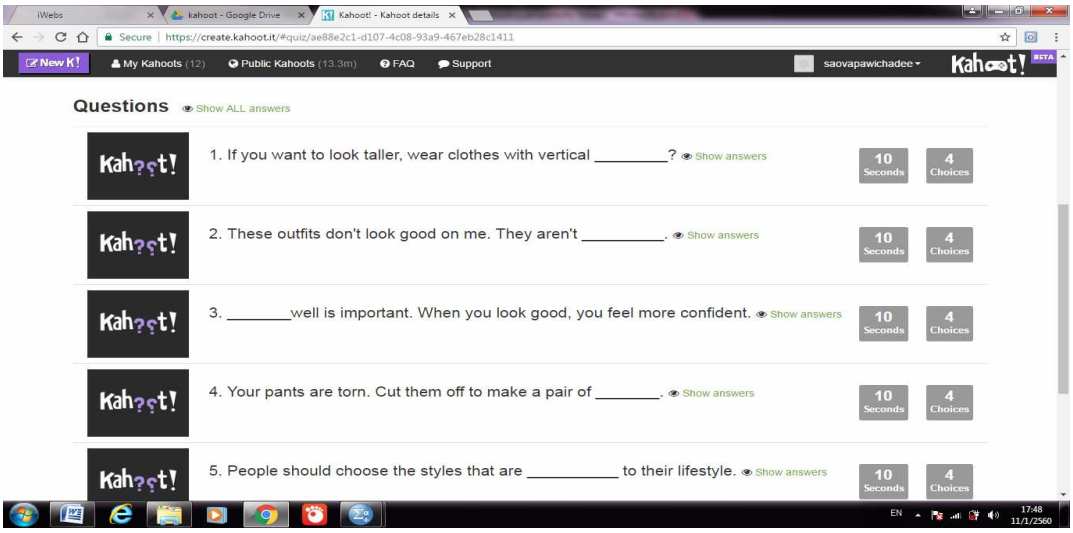
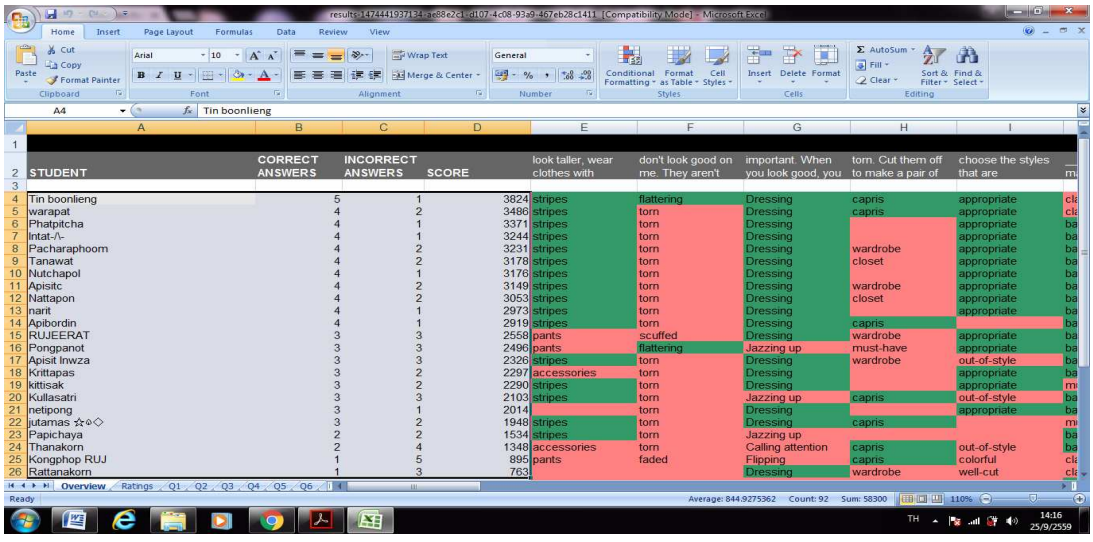


Figure 1. *Kahoot* interface of vocabulary quiz

Before the game starts, students need to register at https://kahoot.it. In this regard, they will be given a game pin number to participate in the game. Then they type in usernames of their choice and the names will appear on the players' list. Since the activities on *Kahoot* are real-time, questions and quizzes can be shown on screen using an overhead projector. Students can check their progress or points right after the game is finished. The total scores for each question are 1,000 points. The scores they earn will be based on their time usage and correctness of answering the questions (Byrne, 2013). The total number of gained scores of each player can be shown on screen at the end of the quiz (see Figure 2).



STUDENT	CORRECT ANSWERS	INCORRECT ANSWERS	SCORE	look taller, wear clothes with	don't look good on me. They aren't	important. When you look good, you	torn. Cut them off to make a pair of	choose the styles that are
Tin boonlieng	5	1	3824	stripes	flattering	Dressing	capris	appropriate
warapat	4	2	3486	stripes	torn	Dressing	capris	appropriate
Phatpitcha	4	1	3371	stripes	torn	Dressing		appropriate
Intat-/\-	4	1	3244	stripes	torn	Dressing		appropriate
Pacharaphoom	4	2	3231	stripes	torn	Dressing	wardrobe	appropriate
Tanawat	4	2	3178	stripes	torn	Dressing	closet	appropriate
Nutchapol	4	1	3176	stripes	torn	Dressing		appropriate
Apisitc	4	2	3149	stripes	torn	Dressing	wardrobe	appropriate
Nattapon	4	2	3053	stripes	torn	Dressing	closet	appropriate
narit	4	1	2973	stripes	torn	Dressing		appropriate
Apibordin	4	1	2919	stripes	torn	Dressing	capris	
RUJEERAT	3	3	2558	pants	scuffed	Dressing	wardrobe	appropriate
Pongpanot	3	3	2496	pants	flattering	Jazzing up	must-have	appropriate
Apisit Inwza	3	3	2326	stripes	torn	Dressing	wardrobe	out-of-style
Krittapas	3	2	2297	accessories	torn	Dressing		appropriate
kittisak	3	2	2290	stripes	torn	Dressing		appropriate
Kullasatri	3	3	2103	stripes	torn	Jazzing up	capris	out-of-style
netipong	3	1	2014		torn	Dressing		appropriate
jutamas ☆◇◇	3	2	1948	stripes	torn	Dressing	capris	
Papichaya	2	2	1534	stripes	torn	Jazzing up		
Thanakorn	2	4	1348	accessories	torn	Calling attention	capris	out-of-style
Kongphop RUJ	1	5	895	pants	faded	Flipping	capris	colorful
Rattanakorn	1	3	763			Dressing	wardrobe	well-cut

Figure 2. The scores shown in order from most to least

2.3 Related research

Many studies indicate that games help motivate students to learn (Connolly, Stansfield, & Hainey, 2011; Ebrahimzadeh & Alavi, 2017; Hanus & Fox, 2015). In addition, the application of digital games further enhances learners' enthusiasm to get involved in learning (Hakulinen, Auvinen & Korhonen, 2015; Lee & Hammer, 2011; Muntean, 2011; Poondej & Lerdpornkulrat, 2016). Students' active participation plays a vital role in enhancing learning effectiveness. It has been found that learner engagement contributes to successful learning performance (Carini, Kuh, & Klein, 2006; Klem & Connell, 2004; McMahon & Portelli, 2004). That is, the more students become involved in the learning process, the more progress they make in their learning.

According to Good and Brophy (2000), highly motivated learners had a higher level of academic accomplishments than their unmotivated counterparts did. However, some studies revealed games might not be useful in terms of learning achievement. For instance, Dominguez, de Navarrete, de Marcos, Fernández- Sanz, Pagés, and Martínez-Herráiz (2013) conducted a study in which gamification was integrated into the course in order to gauge its impact on university students. It was found that the students became more motivated and involved in their learning, however, their levels of achievement remained unchanged. Thus, it is crucial for instructors to find ways to increase both motivation and achievement.

It has also been found that using digital games in the learning process brings benefits for learners as regards developing their problem-solving skills as they spend time practicing the skills in games (Gee, 2003). They also become better prepared to meet challenges such as chaos and frustration since game participants will have to deal with their curiosity and disappointment (Lazzaro, 2004). According to Hamari and Koivisto (2013), most studies about gamification reveal its favorable aspects. However, the levels of success greatly depend on the people who use it and the environment in which it is used. They also found that the same features of gamification might be favored by some but frowned upon by others.

3. The current study

This study aimed to determine how game-based learning affects students' learning performance and motivation as well as investigate their views on gamification. The study adopted a quasi-experimental design. To this end, the following research questions were addressed as follows:

1. Does gamification affect students' learning performance?

2. How does the learning motivation of students in the experimental group differ from that of students in the control group?
3. What are students' attitudes towards application of digital games in language learning?

3.1. Population and samples

The population included 2,645 students (67 sections) who registered for EN013 (3 credits) in semester 1 of the academic year 2017 at a private university in Thailand. Two sections of the students were sampled based on cluster sampling because they all had already been grouped in their own sections. There were 31 males and 46 females. One section comprising 38 students was selected to be the experimental group while the other was chosen to be the control group (39 students). They were the second-year students from School of Humanities and Tourism Management, majoring in Hotel Management, aged between 18 and 24. Both groups were required to attend 3 hours a week for 14 weeks.

3.2. Procedure

Ten vocabulary quizzes and five grammar quizzes were prepared to engage the students in both groups in reviewing the lessons taught each time. However, while the control group was given a revision by means of doing paper quizzes, only the experimental group was treated with *Kahoot*. Students could see how many points they earned at the end. Meanwhile, the control group did the same quizzes, but on paper, and were told about their earned scores in the following week. For both groups, the purpose of doing quizzes was to investigate how well students understood grammar and vocabulary. They were informed that the scores gained from those quizzes would not affect their grades, but the scores they earned from the post-test (30 points) would be calculated for grading in this course. The post-test was done on paper after the course had finished.

3.3. Data collection tools

This study employed three tools to evaluate how *Kahoot* affected learners. The first tool was English proficiency tests which were used to find out the effect of digital game, Kahoot on learners' language performance. The pre-test and the post-test, 30 points each, were written tests designed to test the students' grammar and vocabulary in EN013. Students in both groups were required to take these tests. The tests were set and their validity was approved by three experts from the English Department, Bangkok University, who reviewed and modified

the test items. The researcher created an evaluation form so that each test item was also examined to ascertain that it was in keeping with the objective. In order to calculate the Item-Objective Congruence (IOC) Index, three types of answers were given the following scores: 1 was congruent, 0 was questionable and -1 was incongruent. All the items in this study were congruent because they scored higher than 0.5 on the IOC Index. Some language changes were made in two items. Then 30 students who were not the participants in this study were assigned for the pilot test.

The second tool was a questionnaire modified from Keller's Course Interest Survey (Keller, 1987). It comprised ten items and examined learners' motivation after 12 lessons were completed. Then it was distributed to both groups on week 14 which was the last week. For each item, learners gave their feedback by selecting one out of five levels of their agreement from "mostly agree" to "mostly disagree". The validity of the questionnaire was achieved by obtaining three experts' approval. The questionnaire items were read and answered by 30 students; they were the same group who had been asked to do the pilot test. To gauge the readability, the coefficient alpha technique was applied. Its reliability coefficient being .86, thus, the questionnaire was found to be reliable.

The last tool was a questionnaire investigating students' points of view on gamification. Only students in the experimental group were required to complete this questionnaire after the intervention. The seven items in the questionnaire had been created based on literature review and examined for content validity. As evaluated by three instructors, it was higher than 0.5. The initial version of the questionnaire was piloted before real use. 30 students from the same pilot group were assigned to do this questionnaire. The reason for choosing this group was because they used to join in the *Kahoot* activity in previous semester. The comments from the students enabled the researcher to adjust the language. This was done to ensure that the questions were easy to understand and could elicit the required information.

3.4. Data analysis

The data was analyzed using SPSS (version 16.0). Internal consistency of pre-test scores was assured for homogeneity and normality. An analysis result of the pre-tests of both the control and experimental groups through an independent samples t-test revealed a significant difference. Therefore, one-way analysis of co-variance was conducted with the post-test scores using the pre-test scores as a covariate, and the result yielded a significant difference. The motivation data from both groups collected at the end of the course were calculated. The

P values of the motivation scores of the two groups, when compared with an independent *t*-test, were statistically significant (lower than 0.05). The feedback on the gamification method from the experimental group was treated with mean and standard deviation and interpreted as various levels as follows:

1.00-1.50 meant a very low level of approval 1.51-2.50 meant a low level of approval
2.51-3.50 meant a moderate level of approval 3.51-4.50 meant a high level of approval
4.51-5.00 meant a very high level of approval

4. Findings

Research Question 1: Does gamification affect students' learning performance?

Prior to the use of the gamification technique, the test mean score of the students in the control group was 14.15 with standard deviation of 2.23 and that of the experimental group was 12.63 with a higher standard deviation of 3.37. An independent samples t-test was employed to examine any significant difference. The finding showed that a difference existed at a significance level of .05 ($p < .05$). This means that both groups were not equal.

Table 1. Independent sample t-test results of pre-test scores

Group	n	Mean	SD	df	t	p	d
Control Group	39	14.15	2.23	75	2.330	.023	.681
Experimental Group	38	12.63	3.37				

Therefore, the one-way ANCOVA was instead applied in the comparison of the post-test mean scores. For data analysis, the covariate was the pre-test score, the independent variable was the instruction methods, and the dependent variables were the post-test and motivation scores. Homogeneity was validated through the test for homogeneity of regression coefficients and ANCOVA was used for analysis. As can be seen from Table 2, the outcome revealed that the mean scores of both the control group and the experimental group carried a significant difference ($F = 25.039$, $p = .000$). The assumption then was substantiated. That is, students in the experimental group achieved higher test scores than those in the control group. The mean scores were 22.74 and 19.91 accordingly.

Table 2. ANCOVA test result of learning performance

Source	SS	df	MS	F	Sig.
Corrected Model	566.674a	2	283.337	49.468	.000
Intercept	255.395	1	255.395	44.590	.000
Pre-test	528.359	1	528.359	92.247	.000
Group	143.415	1	143.415	25.039	.000
Error	423.846	74	5.728		
Total	35963.000	77			
Corrected Total	990.519	76			

a. R Squared = .572 (Adjusted R Squared = .561)

Table 3. Mean scores result of learning performance

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1. control	19.916[a]	.390	19.139	20.693
2. experimental	22.744[a]	.395	21.956	23.532

a. Covariates appearing in the model are evaluated at the following values: pre-test = 13.40

Research Question 2: How does the learning motivation of students in the experimental group differ from that of students in the control group?

To examine their motivation to learn, the questionnaire was distributed to both groups at the end of the course. The result indicated that the average score of motivation of students in the experimental group (Mean = 3.42, SD = .44) was much higher than that of the control group (Mean = 3.02, SD = .66). It interestingly reveals that greater motivation is found in the experimental group for all items on the questionnaire. It is also found that the highest mean score of both groups was the same item (‘I am very satisfied with the course’) even though the mean scores were rather different (Mean = 3.79, 3.38). However, the second mean scores of two groups were different. The experimental group indicated item no. 1 (‘I enjoy studying English’, Mean = 3.58) while the control group chose item no.3 (‘I think the given tasks are not too difficult’, Mean = 3.28).

Table 4. Comparisons of mean scores of learning motivation

Motivation	Control		Experimental	
	Mean	SD	Mean	SD
1. I enjoy studying English.	2.92	.84	3.58	.92
2. I actively participate in the activities of this course.	2.85	.81	3.32	.74
3. I think the given tasks are not too difficult.	3.28	1.02	3.32	.66

4. I am very satisfied with the course.	3.38	.99	3.79	.66
5. I feel confident that I will do well in this course.	3.10	.85	3.50	.80
6. The content of this course is useful to me.	3.00	.89	3.26	.72
7. The content in this course motivates me to learn.	2.87	1.00	3.50	.65
8. The activities in the course capture my attention.	2.87	.95	3.42	.76
9. This course can develop my language proficiency.	3.03	1.01	3.26	.64
10. The amount of work in the course is suitable.	2.87	.95	3.21	.81
Average	**3.02**	**.66**	**3.42**	**.44**

To find out whether there was a statistically significant difference between the two groups, the mean scores were compared by using an independent samples t-test. The result revealed a statistically significant difference in the motivation at the level of .05 as shown in Table 5 (*p* =.003).

Table 5. Independent sample t-test results of learning motivation

Group	n	Mean	SD	df	t	p	d
Control Group	39	3.02	.66	75	-3.11	.003	.606
Experimental Group	38	3.42	.44				

Research Question 3: What are students' attitudes towards application of digital games in language learning?

Based on the findings, students in the experimental group accepted the gamification technique at a high level, the average mean being 3.58 as shown in Table 6. That is, overall, the students accepted the gamification technique as they expressed positive views towards it. Students seemed to favor *Kahoot* as a learning tool. Item No. 1 ('This technique made the course more fun') had the highest mean (Mean = 3.87), and item No. 2 ('I like a competition in this technique') had the second highest mean (Mean = 3.76). Item No. 4 ('This technique increased my interest in the lessons') came third with a 3.53 mean score. Item No. 5 ('This technique enabled me to learn better') had the lowest mean score (Mean = 3.45). It was at a moderate level.

Table 6. Students' attitudes towards the gamification technique

Statement	Mean	SD
1. This technique made the course more fun.	3.87	.58
2. I like competition in this technique.	3.76	.67
3. This technique increased engagement with the class.	3.50	.69
4. This technique increased my interest in the lessons.	3.53	.56
5. This technique enabled me to learn better.	3.45	.55
6. This technique is suitable for the language class.	3.50	.56
7. I want this technique to be used in other courses.	3.46	.50
Average	**3.58**	**.35**

5. Discussion

In this experiment, *Kahoot* was introduced in class and its effects on students' learning performance were studied. In addition, their learning motivation and attitudes towards the gamification technique were analyzed based on the course feedback survey. Many findings should be brought to discuss as follows:

The first issue to be discussed is the effect of *Kahoot* on students' language proficiency. Based on the finding, there was a significant difference in post-test scores between the two groups of students. This implied that gamified learning generated more achievement. This is probably due to the fact that the students in the experimental group had an opportunity to revise what they had learned through competition (Kim, 2015). They had more fun playing *Kahoot* games while gaining knowledge. Moreover, *Kahoot* allowed for more engagement in the learning process, and the instructors were able to check student involvement in the activities very easily. The result is consistent with the study conducted by Goehle (2013), who indicated that digital games do not only create a good learning environment, but they also provide more engagement. That is, the competition nature of the games encourages learners to join, enhancing enthusiasm and involvement in learning (Hakulinen *et al.*, 2015; Lee & Hammer, 2011; Muntean, 2011). The more they participated in the games, the more they gained knowledge. As predicted, they obtained better performance than those in the control group. The finding can be used to support the claim that *Kahoot* can stimulate learning and language improvement can occur in a fun learning environment.

The second issue is the increase of the students' motivation. One of the interesting results of this study is that the use of *Kahoot* games had an impact on learner motivation. That is, the experimental group showed much higher motivation than the control group. This is probably because students' learning effort can be observed using *Kahoot* games (Attali &

Arieli-Attali, 2015). In other words, providing instant feedback has a great effect on their motivation. *Kahoot* makes the lessons more interesting, giving all students an opportunity to participate and get feedback or results at once. While playing the game, they can see the tentative winner on the screen. In the past, doing paper-based exercises was the only one way to check if students understood the lessons or not, and they might not be informed of the feedback immediately. The use of digital games for doing exercises or quizzes is, therefore, better than the traditional way. Moreover, since students are in the digital age, they are immersed in technology in daily life. As such, applying technology in the classroom motivates them to learn more when compared to the traditional style of learning. The atmosphere in the experimental class is competitive and fun. They compete in game-like quizzes with enjoyment. The current study proves that learning can come with enjoyment as the students in the experimental group had higher motivation than the control group (Mean = 3.58, 2.92). The finding is in accordance with Lee and Hammer (2011), who asserted that digital games can be used to stimulate learning since they influence mental and social conditions.

The finding also revealed that students viewed the use of digital games in language learning positively. Three reasons can be used to explain this result. First of all, students are accustomed to using a variety of technologies in daily life. A mobile phone is the best equipment for playing games in class because all students have it. Secondly, *Kahoot* allows them to compete with their friends through application on mobile phone. They paid more attention during the lessons since they needed to make use of knowledge in the competition. This interest led to improved learning performance as shown in previous studies (Hidi & Renninger, 2006; Oblinger, 2004). Lastly, the components of *Kahoot* games are suitable for educational purposes. That is, *Kahoot*'s features (e.g. screen, music) are well-designed to draw the players' attention, and the quizzes are provided based on their ability. The finding is in accordance with Kiili's (2005) research, according to which using appropriately challenging activities relative to students' competences could boost students' interest and help enhance students' learning performance. Learning with fun can create good atmosphere. That is why students highly agreed that gamified learning made the course more fun. It can be concluded that *Kahoot* is a good digital game that can be used to increase students' interest in language learning and to make learning more fun.

6. Conclusions and directions for future research

The findings reveal that the gamification technique not only increased students' motivation, but also enhanced their learning outcomes. This indicates that the application of digital games can transform any contents that are boring or difficult like aspects of grammar or vocabulary to be interesting and easier to understand. Games can make students enjoy attending the class. Since the game concerns winning and losing, instructors need to inform them of the real purpose of gamifying language activities. That is, what they can gain more than competition and enjoyment is learning something new such as grammar and vocabulary knowledge. As such, when a correct answer is shown, instructors should explain and give details about it. This is in accordance with what Marklund and Alklind (2016) recommend in that tasks for teachers should be clear from the start when using games in class.

Although gamification proves to be a highly useful way of teaching English, there are many questions to be addressed. First, after exposing to the *Kahoot* games, it is crucial to find out at what point the students will become bored. Secondly, future studies may be conducted to compare other free digital games in relation to language performance; the results can be useful for selecting suitable games for the future courses. It is possible to study if the number of games have an impact on their learning performance. In this regard, it is important to find out which game is the most appropriate to the content of study. Next, to gather more extensive data and statistics, future studies should involve a larger number of students which is a limitation of this study. Then the feedback may reflect what students think and how the gamification technique affects them more clearly. Finally, other research tools such as interviews should also be employed in order to make the studies more comprehensive.

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