The Effects of Using Gamification in Enhancing the
Medical Vocabulary Learning of English III Nursing Students
at a Private University in Nakhon Pathom

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Abstract

The purpose of this research study was to investigate the relationship between gamification with medical vocabulary learning. The researcher employed a quasi-experimental research design within a group of 16 nursing students enrolled in English III reading class. A paired T-test statistical analysis was used to examine the results of pre-test and post-test while, an attitudinal survey was used for the opinions of the students/participants. The gamification such as Kahoot! and Quizizz game-based online platform intervention took 10 hours for two months apart from an hour for pre-test on the first day, and another hour for a post-test on the last day. The results indicated a significant difference of 0.01 in favor of the post-test in which students had significantly improved their medical vocabulary learning; while the students'/participants' opinions of gamification were overwhelmingly positive. The findings of this study were akin to that of previous research indicating gamification such as Kahoot! and Quizizz enhanced the medical vocabulary learning. Most significantly, based on the findings of the present research, it was suggested that the use of gamification could enhance the medical vocabulary learning of the students.

Keywords: Gamification, Medical Vocabulary, Vocabulary Learning

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ผลของการใช้เกมในการเสริมสร้างการเรียนรู้คำศัพท์ทางการแพทย์
ของรายวิชาภาษาอังกฤษ 3 นักศึกษาสาขาวิชาพยาบาลศาสตร์
ที่มหาวิทยาลัยเอกชนแห่งหนึ่งในจังหวัดนครปฐม

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บทคัดย่อ

　　　　งานวิจัยนี้มีจุดประสงค์เพื่อศึกษาความสัมพันธ์ระหว่างการใช้เทคนิครูปแบบของเกมช่วยใน
การเรียนรู้คำศัพท์ทางการแพทย์ ผู้วิจัยทำการวิจัยกึ่งทดลองกับนักศึกษาพยาบาลที่ลงทะเบียนเรียน
วิชาการอ่านภาษาอังกฤษ 3 จำนวน 16 คน โดยนำการวิเคราะห์ผลทางสถิติ Paired T-Test มาใช้วัดผล
การทดสอบก่อนและหลังเรียน (Pre- test and Post-test) และแบบสำรวจความคิดเห็น ถูกนำมาใช้ใน
การสำรวจความคิดเห็นของผู้เรียน ในการใช้เทคนิครูปแบบของเกม เช่น Kahoot! และ Quizizz มาช่วยใน
การสอนนั้น ใช้เวลา 10 ชั่วโมง ภายใน 2 เดือนนอกเหนือจากการทำการทดสอบก่อนเรียน 1 ชั่วโมงในวัน
แรกของการเรียนและการทดสอบหลังเรียน 1 ชั่วโมงในวันสุดท้ายของการเรียนวิชานี้ ผลการทดลอง
เครื่องมือมีค่าความแตกต่างทางสถิติอย่างมีนัยสำคัญ 0.01 แสดงให้เห็นว่า นักศึกษามีการพัฒนาที่ดีขึ้นมาก
ในด้านทักษะการเรียนรู้คำศัพท์ทางการแพทย์ ในส่วนของการทดสอบทัศนคตินั้นจะเห็นได้ว่า ผู้เข้าร่วมการ
วิจัยมีทัศนคติเชิงบวกสูง ผลการวิจัยนี้มีความสอดคล้องกับการวิจัยครั้งก่อนหน้าที่ชี้ให้เห็นว่า การใช้เทคนิค
รูปแบบของเกม เช่น Kahoot! และ Quizizz มีผลต่อการเรียนรู้และเพิ่มคำศัพท์ทางการแพทย์ของผู้เรียน
จึงเสนอแนะได้ว่า การใช้เทคนิครูปแบบของเกมสามารถช่วยนักเรียนในการเรียนรู้คำศัพท์ทางการแพทย์ได้
ดีขึ้น

คำสำคัญ: การใช้เกม, คำศัพท์ทางการแพทย์, การเรียนรู้คำศัพท์

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Significance of the Study

Words are the currency of communication and a robust vocabulary improves all areas of communication - listening, speaking, reading and writing (Alexander, 2017). This is tantamount to what Nation (1994) had stated that vocabulary is not an end in itself and a rich vocabulary makes the skills of listening, speaking, reading, and writing easier to perform. The importance of vocabulary could be understand through these researchers' opinions which will definitely lead to the necessity of motivating and teaching second language learners to have adequate vocabulary learning.

In a Thai setting, competent knowledge of English vocabulary is a constant problem which hinders Thai students to perform better in listening, speaking, writing and reading English language (Liangpanit, 2015). Thai researchers such as Nomsiri (2005), Duadsuntia (2008) and Mongkol (2008) tagged vocabulary learning as a major problem in English language learning. Yet, it remains that vocabulary learning in the classroom is still of little importance. Castro (2015) said that the importance of vocabulary could evidently be perceived in the early part of nursing students' learning at a private university in Nakhon Pathom, Thailand.

In the nursing field, the importance of vocabulary acquisition among nursing students is also evident. Based on the result of a study conducted by Carter and XU (2007) it showed that one of the barriers in the clinical areas included language and communication associated with concern for patient and safety. It means that many nursing students could not perform well in the nursing field because of language and communication problems in dealing with patients specifically in catering their needs. In the university where this research would be conducted, the same scenario was happening.

In the university where the present research took place, Thai nursing students are hesitant to face foreign patients in the hospital because they could not express themselves in English. They have ideas but they lack of vocabulary words to use to bring out what is in their minds. Sukanya, a third-year nursing student, said that it is difficult for her to frame sentences because she does not know what word to use. In the hospital where she has practicum, she continued, that sometimes it is hard for her to understand medical words and it is even harder to explain medical words to foreign patients. It is also difficult for her to understand information in some English books because there are medical words that has no direct translation in a Thai language. It is within this context,

whereby the instructor/ researcher piloted this study in this private institution. The instrument in this study was expected to remediate the medical vocabulary learning of nursing students.

On the other hand, the Bring Your Own Device (BYOD) wave and advancement in technical infrastructure and in learning technology, opens for new ways of teaching in the classroom (Wang 2014). There were more than 85 percent of 500 educational institutions in UK and US (K12 to college/university) allowed bringing one's device in the class (Bradford-Network, 2013). The use of device or gadget in class to use in games serves as a motivating factor for learners. Gamification is the application of game-design elements and game principles in non-game contexts. The goal of gamification is to motivate people to change behaviors or develop skills, or to drive innovation (Burke, 2014). Kahoot! is a Game-based Student Response System (GSRS); it serves as a combination of student response system and a game-based learning platform (Wang 2014; Sharma & Unger, 2016). Quizizz is an online application which allows anyone to conduct student-paced formative assessments in a fun and engaging way for students of all ages (Help Center: What is Quizizz, 2017). Socrative is a web-based platform accessible on Macintosh, Windows, and Chrome-based operating systems – no hardware is installation is required. It can quickly assess students with prepared activities or on-the-fly questions to get immediate insight into student understanding (Socrative Help center, 2017).

The emergence of technology and its positive effect in terms of motivating learners to perform was used in this study. With this concept, the researcher used gamification such as Kahoot! and Quizizz in motivating the English III nursing students and eventually enhanced their medical vocabulary learning.

Research Questions and Objectives

The present research posed two research questions as follows:

1) Does the use of gamification enhance the medical vocabulary learning of English III Nursing students at a private university in Nakhon Pathom?

2) What are the English III Nursing students' opinions towards gamification in enhancing their medical vocabulary learning?

In order to answer the abovementioned research questions, the following objectives were achieved:

1) To compare the results of pre-test and post-test on the vocabulary learning based on gamification, and

2) To analyze the English III nursing students' opinions towards using gamification in enhancing medical vocabulary learning at a private university in Nakhon Pathom.

Theoretical Framework

The present research was comparable to Castro (2016) in terms of using a computer assisted language program to facilitate the importance of teacher preparation and students' opinions who learned by using the program. The students had positive attitudes towards the program which could be manifested in the results of the study.
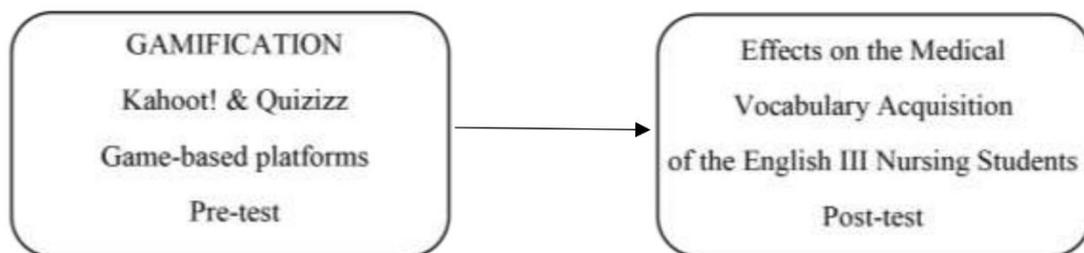

Figure 1: Analytical Framework of Research Study

The above graphical representation clearly shows the framework of the research study with the possible effects according to the study. The teacher/researcher designed gamification via Kahoot! and Quizizz game-based platforms. It was implemented following a systematic procedure. The students/participants did the games online in the classroom. These games focused on the medical English vocabulary words given in class.

The framework of the present research implied that nursing students learning English III were expected to improve medical vocabulary learning through the use of gamification. Also, the present research proved that the use of gamification such as Kahoot! and Quizizz were effective in enhancing the English medical vocabulary learning of English III nursing students at a private university in Nakhon Pathom.

Methodology

A quasi-experimental approach was followed and implemented in this study with a pre-test, post-test and a questionnaire as instruments to gather data. The pre and post tests were compared to evaluate the effectivity of gamification in enhancing the students' vocabulary learning. While the questionnaire was employed in order to gather the opinion

of the participants towards using gamification. The researcher chose to follow this research methodology in order to find out whether the two variables which were gamification and medical vocabulary learning had significant relationship, thus, proving beyond doubt that gamification such as Kahoot! and Quizizz game-based platforms would enhance the medical vocabulary learning of the English III nursing students.

The two variables investigated in this research were gamification, as the independent variable, and medical vocabulary learning, as the dependent variable.

The study was conducted in a heterogeneous English III nursing class at a non-profit private university in Nakhon Pathom. English III is a general English course and it focuses on reading skill. There were 16 students in English III nursing class coming from the nursing college. Purposive sampling was used with a population which was composed of the Thai and international program students in the nursing college. These sixteen students were handled closely for the whole duration of the research.

There were three different instruments served as a tool in gathering the data for reliable results. They were the following:

1) Pre-test

The participants took the pre-test an hour before the treatment. It was a 30-item multiple choice test for an hour. The vocabulary words in the test were taken from the list of medical English vocabulary (English for Nurses and Medical Professionals) which the students used in most of the texts, passages and articles in this reading class.

2) Post-test

It was the same set of test the students took on the first day of the implementation. The results of this tests would be compared to that of the pre-test.

3) Questionnaire

The students/participants answered the questionnaire after the post-test. This survey questionnaire was composed of three parts namely: part one – The general information of the participants, part two – A Likert Scale Survey, and part three – the opinions of the participants about gamification.

The researcher meticulously chose the medical vocabulary words to be taught to the students. These words were taken from the list of medical English vocabulary (English for Nurses and Medical Professionals). There were ten online activities with ten items of

medical vocabulary words each launched every meeting in class. The thirty medical vocabulary words which were included in the pre-test and post-test were taken from the online activities. The researcher asked the opinion of three English instructors, who were all masters in the field of English language. Also, two Nursing instructors from the College of Nursing International department were also asked about the necessity of the chosen medical vocabulary words.

Likewise, the researcher developed the games online using Kahoot! and Quizizz. The contents of each game were prepared by the researcher and they were launched online during the implementation of the research. They were multiple choice games. In the same manner, the pre-test and post-test prepared by the researcher were checked and evaluated by the three instructors who were members of the university English standard committee.

In lieu of this, the research underwent several steps in order to warrant the reliability and validity of the study. The instruments used in this program including the pre-test and post-test, questionnaire, drills and exercises were checked and evaluated by three members of the English standard committee of the university.

There was a pilot-testing of the instruments two weeks before the implementation of the research. Ten students in the other class of the same course answered the pre-test and post-test. The researcher used TAP (Test Analysis Program) software to check the reliability and validity of the pre-test and post-test in terms of its level of difficulty and item analysis. As a result, most of the test items were not too difficult and not too easy. For the items which were difficult and easy, the researcher modified the questions. Not only that, the researcher also focused more attention on those medical vocabulary and exert extra effort for better understanding of the words during the class. The modifications of the tests depended on the result of the pilot-testing.

For the questionnaire, the teacher/researcher discussed the items one by one to make sure that the students clearly understood them. In part III, the participants were allowed to answer in Thai so that they could express themselves comprehensively. They were given enough time to answer the questionnaire in order to draw in-depth information from them. The answers in Thai were translated in English by two Thai English teachers in the same course. In addition to this, the results of pre-test and post-test were not revealed to the participants in order to avoid any psychological consequence.

The data were gathered among the sixteen participants in English III nursing class for three months from May to July. The intervention ran for ten sessions, one hour each, and two sessions for the pre and post-tests. The words were from medical English vocabulary (English for Nurses and Medical Professionals). The instrumentation such as; pre-test and post-test were compared in order to find the effectiveness of using gamification such as Kahoot! and Quizizz in enhancing the medical vocabulary learning and the answer to research question one. The data gathered from the questionnaires served as the answer to research question two.

In order to have an accurate view of the data gathered, the following methods were used:

1)   Statistical program was used to generate a reliable result of the gathered data.

2)   A Paired T-test statistical tool was used to analyze the results of the pre-test and post-test generated from SPSS.

3)   A 5-point Likert Scale attitudinal survey was used to show how the program have affected the participants.

4)   The result of the five-point Likert scale were described using the interpretation of mean scores according to the university interpretation.

Results

Table 1. Showing $\bar{X}$, S.D. , t-value and p-value for Data Analysis of the Pre-test and Post-test of the Participants in Using Gamification to Enhance Medical Vocabulary Learning

Overall	$\bar{X}$	S.D.	t-value	p-value
Pre-test	14.13	4.75	-10.151**	.000
Post-test	22.25	3.61		.000

$**p \leq .01$

It can be seen in Table 1 above that, the participants performed significantly well during the post-test. The results showed that the t-value of the pre-test and post-test was -10.151**. The negative sign indicated that the post-test was higher than the pre-test. The chosen significance level or alpha was 0.01. This showed that there was a statistically significant difference at 0.01 level because the p-value (.000) was lower than the significance level or alpha (0.01). Therefore, the null hypothesis was rejected and

disproved. It evidently illustrates that the participants enhanced medical vocabulary learning using gamification such as Kahoot! and Quizziz.

The part two of the given questionnaire was used to find out the opinions of the participants toward gamification such as Kahoot! and Quizziz using the 5 – point Likert Scale. The results are presented below by means of showing the Mean ($\bar{X}$) and Standard Deviation (S.D.).

Table 2. Ranking of the Participants' Opinions toward using Gamification

Rank	$\bar{X}$	S.D.	Interpretation
1. Using gamification increases medical vocabulary learning necessary in my major field. (Item no. 7)	4.88	0.34	Very Good
2. Using gamification offers exercises and drills geared towards improving my medical vocabulary learning. (Item no. 6)	4.81	0.40	Very Good
3.5 Using gamification allows me to apply the medical vocabulary learning in my major field. (Item no. 5)	4.56	0.51	Very Good
3.5 Using gamification is interesting. (Item no. 1)	4.56	0.81	Very Good
4.5 Using gamification is fun. (Item no. 3)	4.38	0.63	Good
4.5 Using gamification helps me enhance vocabulary learning. (Item no. 4)	4.38	0.50	Good
6. Using gamification is simple and user friendly. (Item no. 2)	3.92	0.57	Good
Total	**4.50**	**0.54**	**Good**

As illustrated in Table 2, the participants had an overwhelmingly positive attitude toward using gamification in enhancing their medical vocabulary learning. Rank 1 (Item no. 7), "Using gamification increases medical vocabulary learning necessary in my major field" showed the highest level of satisfaction ($\bar{X}$ = 4.88). This could be justified with the comments in part 3 of the questionnaire where 9 out of 16 students said that the vocabulary in the exercises could be applied in their daily life at work. Item no. 6 reached second in the rank, with $\bar{X}$=4.81, it was followed by items nos. 1 and 5 (rank 3) with $\bar{X}$=4.56,

while item nos. 3 and 4 showed the fourth rank with $\bar{\mathbf{X}}$ = 4.38. Finally, the lowest was item no. 2, "Using gamification is simple and user friendly" which ranked the fifth ($\bar{\mathbf{X}}$ = 3.92) yet, still a very good rating.

There was an open-ended question in part three of the questionnaire which was used in order to find out the participants' opinions about using gamification to enhance their medical vocabulary learning. The responses of the participants were tremendously positive. The question was, "What can you say about the whole process of using gamification? Did it improve your medical vocabulary learning?" The following were the answers of the participants:

Table 3. Summary of Participants' Responses on the Open-ended Question

Participants	Responses
1	*"I like to do the test online because it's fun and I gained knowledge. Because of the teacher's joyful explanation. I remember the content."*
2	*"I've learned more vocabulary words and done many exercises online. There were games to play on the internet. These can be used in a hospital setting."*
3	*"I like to do exercises on the web. The vocabulary words are practical in hospitals."*
4	*"Online games are very interesting and fun. Quizizz is very fun also and the vocabulary words are good for me to use in the hospital duty."*
5	*"The teacher taught in a joyful/ fun way with clear explanation. Every week, there were exercises to check students' comprehension towards each topic."*
6	*"The teacher is kind and understands every student. It's joyful teaching. Exercises help students to get points. This is a different way of learning and teaching because of technology application. I feel very good to study English 3."*
7	*"For English 3, I feel that the teacher taught very well. The teacher prepared/ provided nursing vocabulary that can be used in a real life. Learning in this class is fun and not serious. The content is not too much or too less. The teacher taught well. She is friendly. These make me study without pressure/ stress."*

Table 3. Summary of Participants' Responses on the Open-ended Question (Cont.)

Participants	Responses
8	*"Kahoot and quizizz are very fun. I like to answer the exercises online because they are colorful and sound is fun also."*
9	*"I have improved my skill very much. Vocabulary words are easy to understand and memorize. I could possibly apply them to my study and work very well. Thank you so much."*
10	*"The teacher's voice is loud enough and clear. I want her to explain more thoroughly and focus more on vocabulary. I want more explanation. Studying with teacher is fun."*
11	*"It can be applied to the daily life and study in different subjects. Also, I know the meaning of new vocabulary words from the class; they are practical."*
12	*"The internet game is not stressful. I like Kahoot very much. The teacher prepared well to teach students in class. Very good."*
13	*"Based on the teacher's teaching, there are exercises and good explanation. There is time to do the self-practice; I can learn new vocabulary and try to understand the lesson during self-practice. The teacher's instruction is fun/ not stressful; therefore, I like to come to class every week."*
14	*"Good teaching. The vocabulary and contents are applicable to working. Learning in this class is fun and not stressful. The teacher always comprehensively explains to the students. It's not stressful to learn."*
15	*"Help me learn new vocabulary and apply those words to my daily life and work."*
16	*"Online games are very fun. I like to play and learn at the same time. It's not boring. The vocabulary words are applicable to me as a nurse in the hospital."*

All the participants claimed that using gamification truly improved their medical vocabulary learning and this could be manifested in the result of their post-test which is higher than their pre-test. Most of them believed that, the medical vocabulary embedded in this study helped them in their daily work at the hospital. Also, they mentioned that, gamification helped them learned new words. Using online exercises were also

appreciated by the participants saying that, it made them interested in answering because of technology. Thus, the participants added that, the class was fun, not stressful and not boring.

Consequently, the constructive opinions of the participants made the researcher conclude that the use of gamification should be included in the curriculum not only in English III class but also, in all English classes especially in enhancing vocabulary learning of English language learners.

Conclusion and Discussion

As early as 1972 (Wilkins) acknowledged the importance of vocabulary by stating that, while without grammar very little can be conveyed, without vocabulary nothing can be conveyed. This was supported by Sedita (2005) by saying that, vocabulary knowledge is important because it encompasses all the words we must know to access our background knowledge, express our ideas and communicate effectively, and learn about new concepts. Lately, David (2010) alleged that, learners who start schooling with limited vocabulary, especially foreign and second language learners, often struggle to understand what they read because they do not understand what they are reading. These researchers do not only help us understand the importance of vocabulary but also proved the necessity of teaching vocabulary in the classrooms at all times.

The implications derived from the present research is that, teaching medical vocabulary using gamification such as Kahoot! and Quizizz is effective and efficient. Throughout vocabulary drills, it could be observed that the English III nursing students performed well when they are having fun and when they participate using their gadgets. The teacher/ researcher also employed a variety of words which nursing students often used in the hospital setting.

Additionally, direct instruction of medical vocabulary in English III reading class is recommended because it could help them in their reading comprehension of medical texts and passages. Aside from that, it could also help nursing students in their actual performance in medical context.

Likewise, the findings of the present study suggests that nursing students must be taught medical vocabulary using gamification such as Kahoot! and Quizizz. It is a valuable instructional aid that should be supplemented to the rest of the vocabulary teaching strategies used by teachers in a reading class.

After a ten-week intervention, it had shown that the participants really performed better because the result of the post-test is higher than the pre-test as it was illustrated in Table 4, page 31. Aside from this, the constructive results showed that implementing gamification like Kahoot! and Quizizz enhanced the medical vocabulary learning of English III nursing students at a private university in Nakhon Pathom.

The present study is similar to the result of study conducted by Richardson (2009) in terms of internet activity and trivia game in increasing the overall grades of seventh and eighth-grade science students. There were 200 eighth-grade and 55 seventh-grade students/participants answered the pre-test and post- test, questionnaires, writing activity and competitive trivia game. The results of the study revealed that there was a significant difference between the grades on the pre-test and post-test, indicating that the students performed better following the activity. Students' feedback also indicated that the overwhelming majority enjoyed the activity; in which 85.7% claimed "liked it" or "loved it". The study indicates that students benefit as well as enjoy trivia based gaming for educational purposes.

In Taiwan, a relevant study conducted in by Bin-Shyan Jong et al. (2013) investigated online game use in an operating systems course using a game-based cooperative learning method to improve learning motivation in college students. The study consisted of 128 students enrolled in the Department of Information and Computer Engineering at a university in Taiwan. Results showed that students' desire to win the game motivates them to learn from online course materials before they play, which was believed to enable them to achieve better learning outcomes. The students had positive interactions with their peers during the game and it helped them learn more when compared to traditional classroom exercises.

Furthermore in Thailand, a comparable study was conducted by Dewan (2013) among 60 second-year nursing students at Prince Songkla University, Hat Yai Campus. The study was to investigate the effectiveness of a computer assisted language learning package to enhance vocabulary acquisition and retention. The treatment lasted for two months where the subjects had studied 12 target nursing vocabulary words for 10 lessons. A pre-test and a post-test were taken by subjects in order to determine the effectiveness of a computer assisted language learning package with a questionnaire to find out their attitude towards learning vocabulary words using computer assisted language learning package. As a result, the students acquired significantly more vocabulary words based on

the results of the post-test which was higher than the pre-test. The subjects' attitudes towards the computer assisted language learning package were also positive providing them with essential techniques for independent learning of new vocabulary.

Another study by Tunchalearnpanih (2012) using vocabulary games for improving vocabulary knowledge of prathom 6 students. The participants took pre-test and post-test, and answered a self-reflection form in order to gather their opinions about the activity. There were 40 students participated and which were chosen randomly from five rooms. After six weeks of intervention, results showed that the post-test was higher than the pre-test. The students' opinion reflected that the game helped them remember more words and that, the students' vocabulary knowledge was improved after they studied through games.

In the same university, Castro (2016) examined the relationship between computer assisted language learning program with vocabulary knowledge. The researcher employed a quasi-experimental research design within a group of 20 first-year students enrolled in English I class. A paired T-test statistical analysis was used to examine the results of pre-test and post-test while, a 5-point Likert scale attitudinal survey was used for the opinions of the participants. After two months of intervention, results showed that there was a significant difference of 0.01 in favor of the post-test in which students had considerably improved their vocabulary knowledge; while the participants' opinions of the whole program was significantly positive.

In conclusion, the findings of the present research supported the previous studies that the use of gamification could enhance the medical vocabulary learning of the participants. Added to this, the participants had positive attitudes regarding the whole program.

Recommendations for Administration and Further Study

The present study emphasized on the use of gamification such Kahoot! and Quizizz in enhancing the medical vocabulary learning of the English III nursing class. Based from the results of the study, the students/participants medical vocabulary learning were enhanced which could be supported by the high scores in post-test. Aside from that, their opinions toward using gamification were constructively stated in the likert survey.

Due to this, it could be noted that using technology in class helped the students become motivated to learn medical vocabulary. These words are necessary for the participants to be effectively functional in the workplace especially in the hospital setting.

As teachers, we need to be creative and should spend extra effort to produce such activities online. It would also be of great help if there would be opportunities for seminars and conferences to improve the teachers' capacity especially in creating activities online. Since the university's general English courses are geared towards English for Specific Purposes, it would be good if English instructors will be also exposed into other fields aside from English language. This would help them become knowledgeable and confident in teaching students in different levels and major fields.

Another avenue of this study could be a possibility of a qualitative approach of research. The interaction between the teacher and the students and the students themselves during the intervention could be studied. An in-depth interview regarding students' attitudes towards the teacher and the online activities before and after the intervention could be an interesting subject to be given attention.

Further research could also be done in a larger number of participants and it can be conducted in a different major fields and level of students in order to give the study a wider scope. It could be implemented to some other universities and to some other programs not only in nursing students in Thailand and elsewhere.

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