IMPLEMENTING GAMIFIED VOCABULARY LEARNING IN ASYNCHRONOUS MODE

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Abstract: Gamified online quizzes have gained popularity for their potential in enhancing student learning motivations, creating engaging lessons, and improving learning outcomes. Yet, its application and effectiveness in support of student vocabulary learning have only been explored in synchronous learning setting. This study, hence, extended the exploration by examining the implementation of gamified vocabulary learning in an asynchronous mode and analyzing the impacts on students' learning outcomes in class. The study was carried out for 10 weeks, involving 300 2nd year students at a Thai university. The instrument and measure comprised 500 English academic words made into 10 vocabulary sets on *Quizizz.com*, and 10 in-class vocabulary tests. The findings of the study revealed that students' vocabulary learning practice in asynchronous mode had positive correlations with and could significantly predict their in-class vocabulary results. Female students outperformed male students; nonetheless, there was no significant difference across academic majors.

Vocabulary is indisputably important to function in a foreign language such as English, as confirmed by EFL teachers (Fisher & Frey, 2010). Early studies have shown that EFL students need to know a certain quantity of words to execute certain language activities. For example, EFL learners must know between 2,000 and 3,000 words to participate in basic everyday conversation and read authentic English texts (Schmitt, 2007); other research suggests that to perform oral discourse and comprehend written texts, knowledge of 8,000-9,000- and 5,000-7,000-word families is required (Laufer & Ravenhorst-Kalovski, 2010; Nation, 2006). At the university level in numerous nations, thresholds for vocabulary instruction hours have been established. In Japan, for example, students are given 800 – 1,200 hours of teaching to learn 2,000 – 2,300 words; in Indonesia, 1,200 hours of instruction are given to learn 1.200 words; and in China, 1,800 – 2,400 hours are given to English major students to learn 4,000 words (Schmitt, 2008). In Thailand, students are required to study 3,000 English words over the courses of their first two years of university education in a total of 216 instructional hours (Waluyo, 2020a). Formal vocabulary learning, on the other hand, is still striving to discover the right

instructional designs. The problems stem from the fact that class time is limited, teachers have more lessons to cover, and each word has its own set of complications (Johnson et al., 2016).

Driven by the aforementioned concerns, the present study attempts to explore the integration of gamification into vocabulary learning instruction, which specifically focuses on examining the implementation of gamified vocabulary learning in an asynchronous mode and analyzing the impacts on students' learning outcomes in class. Gamification has changed the landscape of vocabulary learning, among other things. Gamifying vocabulary learning is one way to engage children in learning words in a fun way while still providing complete vocabulary training (Kingsley & Grabner-Hagen, 2018; Waluyo & Bakoko, 2021). Previous research has demonstrated that gamified vocabulary learning can greatly improve student motivation and engagement, potentially leading to higher learning results (e.g., Medina & Hurtado, 2017; Weissheimer et al., 2019). However, in-class implementation continues to dominate studies on gamified vocabulary learning. Meanwhile, there are a certain number of words that must be learned to function in the English language (Stahl & Nagy, 2005), which are typically not covered by teaching the target words during class time. Learning L2/foreign language vocabulary has always been challenging, and success may be contingent on students' ability to learn the terms independently (Agustin-Llach & Alonso, 2017). Thus, studies exploring the implementation of gamified vocabulary learning in asynchronous mode can confirm whether it has the potential to enhance in-class vocabulary learning outcomes.

LITERATURE REVIEW

Vocabulary Learning

Vocabulary learning is of critical importance in language competence. It is a requisite for learners at different English levels to conduct speaking and writing communications. Mutlu and Kaslioglu (2016), and Zhong and Hirsh (2009) pointed out that learners having a wide vocabulary could use English better than those knowing less vocabulary. They could in addition recognize the right lexical chunks or groups of words going together, therefore their English performance is quite native-like (Lewis, 2000; Nesselhauf, 2003; Tran & Waluyo, 2021). According to Schmitt (2000), there are two conceptions of vocabulary learnings: explicit and implicit learning. Explicit vocabulary learning refers to the concentrated study of word items. Learners determine the word forms, meanings, and illustrative examples by themselves. They then do many relevant exercises to be able to discern the employment of the words. Meanwhile, implicit vocabulary learning pertains to learning word items through reading or listening. By exposing many academic texts, learners could notice word occurrence, and gradually keep in mind how the words are used. In this study, the term gamified vocabulary learning in asynchronous mode inclines to adhere to the conception of explicit learning since a set of explicit instructions is provided for the students.

Gamified Vocabulary Learning

Gamification is the process of incorporating game thinking and game mechanics into non-game activities to engage in problem-solving activities related to the learned lessons; hence, it

contains game-like aspects such as reward, point, and top-scoring leaderboard in educational environments (Seaborn & Fels, 2015). Integrating gamification into vocabulary learning opens the opportunity to create gamified vocabulary learning instructions that may involve various online gamification tools suitable for vocabulary learning. Recently, Ulla et al. (2020) explored how English language teachers used various internet-based applications in an EFL classroom; they identified some online gamification tools favoured and used by English teachers, including *Kahoot.com, Socrative.com, Quizizz.com,* and *Quizlet.com*. By incorporating these tools into vocabulary learning instructions, traditional learning can be transformed into interactive learning modes. As previously stated, relying solely on teachers' explanations and class hours for learning is counterproductive and limits the number of words that students can learn. Gamification has steadily emerged as one alternative method for improving learner vocabulary learning during the previous decade. It can add a layer of fun to the learning process by including learners in-game aspects such as quests, challenges, levels, and prizes, which can boost motivation and involvement in the learning process (Kingsley & Grabner-Hagen, 2018; Pratiwi & Waluyo, 2022).

Zou et al. (2019) lately analyzed 21 research papers published in SSCI journals that looked into digital game-based vocabulary learning. They came up with four conclusions: (1) digital games aid vocabulary learning; (2) interactions in-game settings aid vocabulary learning; (3) game-embedded multimedia aids vocabulary learning; and (4) over-described vocabulary information is preferable to less specified vocabulary information. In an earlier study, Abrams and Walsh (2014) developed gamified vocabulary learning instructions and used them in their New York City classes with 11th graders and young adults. Gamified vocabulary enabled learners to be agents of their own learning and boosted interest-driven learning, according to the researchers. However, because of the competition component, gamification can discourage low-level learners, and its regular use may cause boredom and learners to lose interest in learning. Another advantage of gamified vocabulary learning is that it might make it easier to use repetition strategies in vocabulary learning while keeping the process fun for students. This is supported by Chen et al.'s findings (2019), which looked at the impact of a mobile game-based English vocabulary learning app among Taiwanese EFL students. The experimental group that used gamified online applications for asynchronous practice performed better in both vocabulary acquisition and retention, and students' involvement with the gamified app was positively connected with their vocabulary learning performance, according to their findings.

Gamified Learning Using *Quizizz.com*

Quizizz.com is an online gamification tool used in this study. *Quizizz* has received a lot of attention for its gamified online quizzes. It supports both solo and group work and is appropriate for in-class and take-home projects in the fill-in-the-blank, open-ended, and multiple-choice test forms. Teachers can personalize the tests to fit their teaching goals and students' English proficiency levels, as well as set a timer, shuttle questions and answers, add memes and music, and display a leaderboard after each quiz. After the test, students can access their live results and quiz reviews. *Quizizz* was more beneficial for both learning and assessment than other applications (Basuki & Hidayati, 2019). It helps students become more attentive to test items

than *Google Forms* and *Kahoot* applications do. Being able to offer quick responses makes learners feel more at ease during tests as well as serves as immediate feedback for students.

Gamified quiz application, such as *Quizizz.com*, is a form of game-based learning which utilizes game elements to create activities for lessons (Deterding, 2011; Rahman et al., 2018; Zainuddin, Shujahat et al., 2020). It aims to improve conventional teaching methods, which are teacher-centered instruction and exam-oriented learning (Li et al., 2014), enhance learners' lesson participation, and improve their learning outcomes (Tchakounté et al., 2020; Zichermann & Cunningham, 2011). The quiz makes lessons more fun and compelling. Learners are willing to raise their lesson concerns and get motivated on the completion of difficult tasks. Moreover, gamified quizzes play a crucial role in formative assessments (Topîrceanu, 2017). It supports teachers to elicit students' knowledge and trace their emotional and cognitive traits through game elements such as scores, badges, rankings, records of achievement, and leaderboards (Goksun & Gursoy, 2019; Shafie & Abdullah, 2019). Accordingly, teachers could conduct lessons more smoothly, and learners could develop the required skills of academic training better (Azmi et al., 2017; Zainuddin, Chu et al., 2020).

In the rich-technology era, gamified online quizzes have been widely used at many colleges. It is suitable for distance learning and enables learners to fulfil assignments inside and outside the classroom (Pitoyo, 2019). The quiz likewise helps teachers fast-track learners' knowledge achievement, and obtain their feedback immediately (Goksun & Gursoy, 2019). Of the online quizzes, the *Quizizz* quiz has attracted more teachers' attention. It is frequently utilized for examining learners' knowledge of prior lessons under the test formats of fill-in-the-blank, open-ended, and multiple-choice. The quiz also provides students' live results, data analysis, and quiz review right after the test. Furthermore, it offers both individual and teamwork and suits in-class or take-home assignments (see Figure 1) (Zainuddin, Shujahat et al., 2020; Zhao, 2019). On top of this, teachers could customize the quizzes according to their teaching goals and students' English proficiency level. They could set a timer, shuttle questions and answers, add memes and music, show leader board, and redeem incorrect questions in each quiz item.
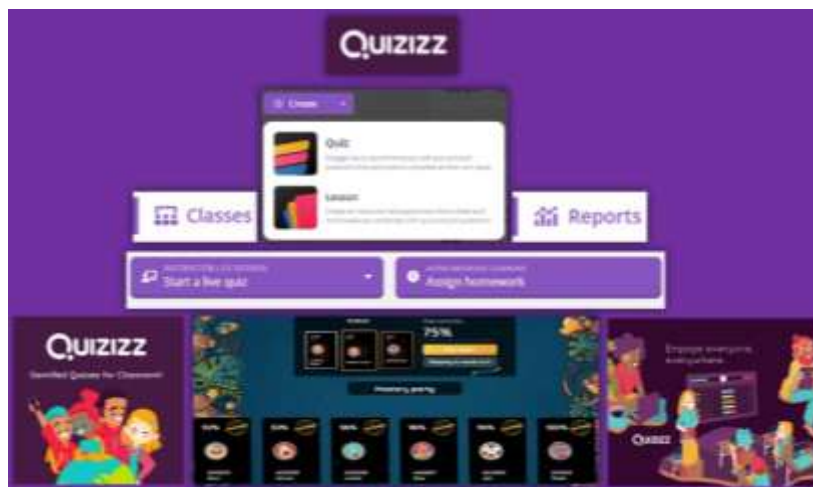

Figure 1. Illustration of the Online Quizzes on *Quizizz.com*

Empirical studies have indicated that Quizizz online quiz has a paramount meaning in vocabulary teaching and learning. It fosters learners' intrinsic motivation for positive learning behaviors and contributes to their positive perception of lesson contents (Goksun & Gursoy, 2019). Learners pay more attention in the class and increase their learning retention. They could thereby develop their ability to recognize, and use instructed vocabularies during the instruction (Amorchewin, 2018; Goksun & Gursoy, 2019). Bal (2018) demonstrated that the *Quizizz* quiz is the best application for vocabulary acquisition. Through game-like activities, learners could further expose assigned vocabularies and drill relevant exercises. They could acquire the vocabularies quite better than those using traditional paper-based activities in vocabulary learning. In addition, Castro and Kimhachandra (2019), Permana and Permatawati (2019), and Rakangthong and Yimwilai (2020) found that undergraduate students performed better in the post-test of non-technical and technical vocabularies after using the quiz in vocabulary learning. They could recognize the word forms and meanings and know how to use the words in real-life situations. Importantly, teachers could use the quiz as a means of monitoring learners' progress and their weakness and strength during the training (Permana & Permatawati, 2019).

Moreover, earlier studies pointed out that the *Quizizz* quiz was more beneficial than other applications in assessments. It aids learners to become more attentive in response to test items than Google Forms and Kahoot applications (Basuki & Hidayati, 2019; Rahman et al., 2018; Zhao, 2019). The quiz could lower learners' test anxiety, and stimulate their performance in any exam (Pitoyo, 2019; Tchakounté et al., 2020). Learners feel more relaxed in the test room, thus are able to concentrate on questions and deliver quick answers. This is in line with recent findings of a positive correlation between learners' motivation and their test performance (Rahman et al., 2018; Zainuddin, Chu et al., 2020).

Asynchronous Learning Mode in Online Gamification Apps

Online gamification tools that enable the creation and utilization of online quizzes, e.g., *Kahoot.com and Quizizz.com*, have added the feature so-called "Asynchronous Learning" mode, where teachers can assign the online quiz as homework. In this learning mode, teachers can create a range of times or dates as the period for students to finish the online quiz outside the classroom. Teachers can access the report of student performance after the quiz is over. This learning mode also offers flexibility for students to do the online quiz as a practice anywhere and anytime as they wish by using their smart devices. Empirical studies on the use of online quizzes in this form of learning have indicated that using online quizzes in an asynchronous mode can serve as a means of vocabulary practice for students, accelerating their growth of autonomy in vocabulary learning (Cunningham, 2017) and it enables the teacher to overcome challenges such as the restricted class time and the necessity to cover a specified number of English words in a given amount of time (Robertson, 2015).

Furthermore, Dreyer (2014) investigated the impact of computer-based self-access learning on vocabulary test scores over a 14-week period, using an online quiz tool to construct vocabulary sets for students to study at home each week, followed by weekly vocabulary examinations in class. The teacher kept track of the students' development via the internet. As an outcome, learners who used the online quiz regularly for their vocabulary learning and

training at home outscored those who used it less frequently in vocabulary tests. Runhaar et al. (2012) divided a class into intervention and control groups based on reports of reading difficulties. The intervention group received online quizzes-based home-learning support, but the control group did not. The results showed that students in the intervention group spent less time in reading on vocabulary and general language questions than those in the control group, and they were also more active and involved in reading class activities.

However, studies have found that there are a few things to keep in mind when using an online quiz in synchronous mode. Tosun (2015), for instance, used an online quiz in a blended learning class for six weeks and found no significant variations in students' vocabulary scores in the experimental and control groups. It was also stated that just because the teacher provides gamified learning support does not mean that students are willing to study the vocabulary sets independently at home. Therefore, the teacher should devise a learning plan that incorporates an online monitoring system.

Academic Major and Gender in Gamified Learning

Recent research on gamified learning have incorporated academic majors and gender as variables of interest. Regarding the importance of academic majors, previous research has suggested that this variable be investigated more in gamified learning (Legaki et al., 2019). Studies have found that gamified learning has had a greater impact on the learning outcomes of students majoring in Electrical and Computer Engineering than in Business Administration (Legaki et al., 2020), and that students with non-geographic or non-science backgrounds had a lower experience rating than those with geographic or science backgrounds (Heintzman, 2020). However, little is known about the distinct effects on students in various academic disciplines.

Furthermore, by gender, female students have been shown to benefit more from gamified learning modes (Legaki et al., 2020) because females are generally more motivated by challenge than by competition (McDaniel et al., 2012) and receive higher levels of playfulness in gamified educational content (Codish & Ravid, 2015), which boosts their motivation and improves their learning outcomes. Yet, Zahedi et al. (2021) suggest that gamification is a gender-neutral learning engagement method that enhances female students' performance just as much as male students' performance. Research involving these variables is, however, still scarce, particularly in the context of Thai EFL learners; so, the current study attempts to contribute to the literature by analyzing these two variables.

The following research questions are addressed in this study after analyzing the body of literature and identifying the research gap:

1. What is the relationship between student performance in asynchronous online quizzes and their performance on a vocabulary test in class?

2. Is there any evidence of significant disparities in vocabulary acquisition by academic major and gender?

3. To what extent can asynchronous gamified vocabulary learning predict performance on a classroom vocabulary test?

METHOD

Research Design

This research was quantitative in nature. It primarily looked into how implementing gamified vocabulary learning in an asynchronous environment improves students' vocabulary learning outcomes in class. The gathered data involved students' performance on asynchronous online quizzes and in-class vocabulary assessments. The interrelationships between the variables of interest were investigated in the data analyses. Such constraints and objectives could be accommodated by quantitative research design (Fryer & Ginns, 2018). Figure 2 below illustrates the research design.
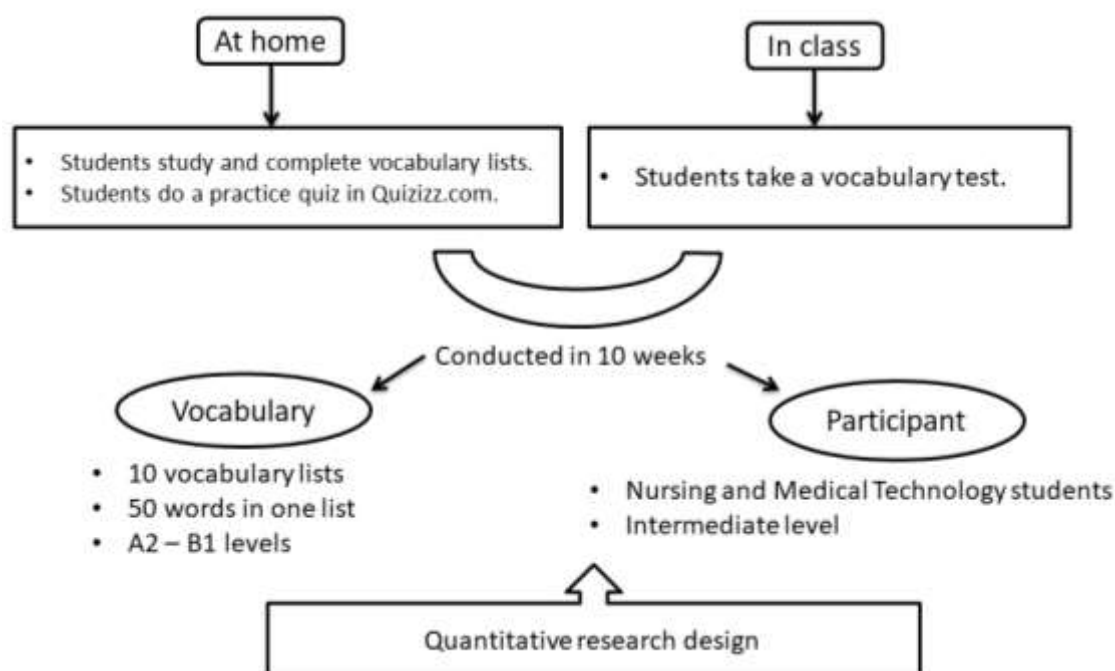

Figure 2. Illustration of the Research Design

Participants and Context

The participants consisted of 300 2nd year university students of an autonomous university in the south of Thailand. They were between the ages of 19 and 22, and their result on the university proficiency test, corresponding to an IELTS score of 5.0, placing them in the intermediate English level. The participants had a year of academic preparation and were chosen on a randomly basis. They were split into two classes, each of which contained 150 students. There were 22 males (14%) and 128 females (86 %) majoring in Medical Technology in the first class, and 13 males (8 %) and 137 (92 %) females majoring in Nursing in the second class.

In the second term of the academic year 2019-2020 (October 2019-January 2020), all the participants completed a 12-week course on English for Media and Communications, which included mandatory vocabulary study. From week 2 to week 11, for a total of ten weeks, they received weekly homework consisting of 50-word items.

Instrument and Measure

Target Words

The vocabulary learning focused on English academic words in the CEFR *(*Common European Framework of References*)* range of A2 to B1. In this study, students were required to learn 500 words from the course. The overall number of words was determined by the university academic committee: by the end of their second year of study, students were obliged to have mastered 3,000 English academic words. Because students had to attend six mandatory General English courses within two years of starting their studies, it was agreed that they would learn 500 words in one course. After that, the 500 words were separated into ten vocabulary groups, each including 50 words. In one week, students studied one vocabulary set at home on their own. Students would take a vocabulary exam the next week in class, which would assess their vocabulary understanding of the words in the set, and this would be repeated weekly. The vocabulary learning lasted 10 weeks. Table 1 presents some of the target words.

Table 1. Sample of the Target Words

Affinity *(n)*	Array *(n)*	Ashamed *(*adj*)*	Astonish *(v)*	Awesome *(*adj*)*
Backtrack *(v)*	Backyard *(n)*	Cranky *(*adj*)*	Behaviour *(n)*	Black sheep *(n)*
Blogger *(n)*	Blogosphere *(n)*	Celebrate *(v)*	Complication *(n)*	Compliment *(n)*
Creature *(n)*	Curious *(*adj*)*	Decisive *(*adj*)*	Descriptive *(*adj*)*	Diversify *(v)*
Everybody *(n)*	Exaggerate *(v)*	Formulation *(n)*	Unforgettable *(*adj*)*	Graduation *(n)*
Granny *(n)*	Structure *(n)*	Appearance *(n)*	Kin *(n)*	Lawful *(*adj*)*
Climax *(n)*	Meanwhile *(*adv*)*	Moment *(n)*	Curious *(*adj*)*	Decisive *(*adj*)*
Dashboard *(n)*	Embarrass *(v)*	Eventually *(*adv*)*	Identify *(v)*	Jealous *(*adj*)*
Treat *(v)*	Unlucky *(*adj*)*	Youthful *(*adj*)*	Approbation *(n)*	Buyer *(n)*

Note. n = noun; v = verb; adj = adjective; adv = adverb

Gamified Online Quizzes Assigned in an Ansychronous Mode

Students were instructed to complete the gamified online quizzes on *Quizizz.com* every week for their vocabulary practices. All of the quiz questions were created based on the target words that students had to sudy in the particular week. *Quizziz.com* had a total of 10 vocabulary quizzes following 10 vocabulary sets learned for 10 weeks by the students. The total score for each quiz was 100. Every week, teachers documented student performance in each quiz assigned in the asynchronous mode.
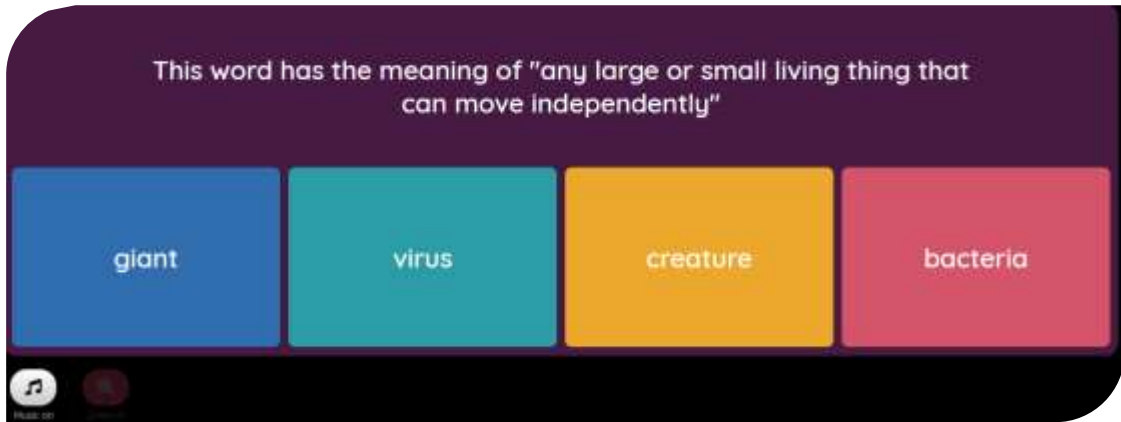
Figure 3. Sample of the Online Quiz

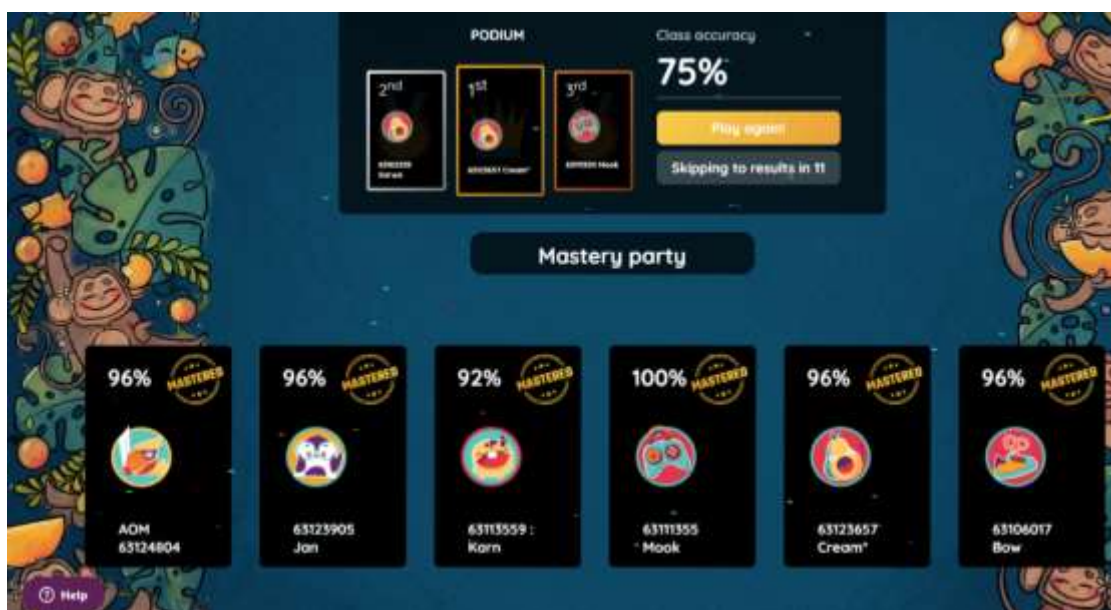**Figure 4. The Appearance of the Online Quiz on Students' Smartphones**

Figure 5. The Dashboard of the Online Quiz

Vocabulary Test in Class

Students attended the English class on the seventh day of the week and were given a vocabulary exam to evaluate the effects of their vocabulary learning at home. Each vocabulary exam was created by using the word list provided in the previous weeks. Word meaning and form, sentence completion, and antonym-synonym were among the test questions. In total, ten in-class vocabulary tests were given over ten weeks. The total score was 15 for each test.

Table 2. Sample of the In-class Vocabulary Test

No.	Questions	Choices
1.	A person who owns a particular type of business, especially a hotel, a shop, or a company that makes newspapers	A. professional B. proprietor C. proficient D. projector
2.	"If you want to have a good wife, find a virtuous woman." What does virtuous mean in this sentence?	A. having good moral qualities and behaviour B. Lacking sophistication or good taste C. Senses or mind aesthetically D. Brave and strong
3.	To suggest a theory, idea, etc. as a basic principle from which a further idea is formed or developed.	A. postulate B. problem C. proficient D. promulgate

Procedure of Intervention

In one week, the intervention was conducted in three stages:

Stage 1
Students completed word forms, meanings and illustrative examples of the provided words in the given vocabulary list within the first four days of a week.

Stage 2
Students completed a multiple-choice quiz, administered using *Quizizz.com*, for vocabulary drill, and reviewed acquired vocabularies on days 5 and 6.

Stage 3
Students took an in-class vocabulary multiple-choice test to check their recognition of the words on day 7.

Ethical Consideration

This study had received the approval from the Dean and Research Committee of the university where this study was conducted. Participation in this study was entirely voluntary, and it had no bearing on the students' grades. Throughout the study, identification numbers were used instead of students' names, and they would not be released to the public. The researchers had completed research conduct training in the social sciences and humanities and had been granted legal permission to conduct empirical research in the field.

Data Collection and Analysis

This study used the *IBM SPSS Software Version 23* to perform descriptive statistics, bivariate correlation, independent t-test, and multiple-linear regression to answer the research questions, as mentioned in the results section. Table 3 below outlines the details of the research questions, data collected, and data analysis technique employed.

Table 3. Data Collection and Analysis

Research questions	Data collected	Data analysis technique
1. What is the relationship between student performance in asynchronous online quizzes and their performance on a vocabulary test in class?	Students' scores on their vocabulary practice using the gamified online quizzes and in-class tests	Descriptive statistics and bivariate correlations
2. Is there any evidence of significant disparities in vocabulary acquisition by academic major and gender?	Students' scores on their vocabulary practice using the gamified online quizzes, in-class tests, students' genders, and students' academic majors	Independent t-tests

Research questions	Data collected	Data analysis technique
3. To what extent can asynchronous gamified vocabulary learning predict performance on a classroom vocabulary test?	Students' scores on their vocabulary practice using the gamified online quizzes and in-class tests	Linear regressions

FINDINGS AND DISCUSSION

Findings

Descriptive Statistics

Overall, the means of students' scores on their vocabulary practice using the gamified online quizzes and in-class test were 76.69/100 (SD = 13.60) and 10.37/15 (SD = 1.55), respectively. The trend of students' scores on practice and in-class test for ten weeks displayed fluctuation without a particular pattern. For example, there was an increase on the means of students' practice scores from test 1 (M = 65.18, SD = 22.97) to test 2 (M = 76.26, SD = 20.91), which was also followed by an increase on the means of their scores from in class test 1 (M = 8.68, SD = 2.57) to 2 (M = 10.79, SD = 2.77). In test 3, students' practice scores declined (M = 71.97, SD = 22.95), but the mean of their in-class test almost did not change at all (M = 10.32, SD = 2.30). Their practice scores increased again in test 4 (M = 79.55, SD = 18.44) and so did their in-class test scores (M = 11.44, SD = 11.1.99); then, their scores in practice (M = 77.78, SD = 20.09) and in-class test (M = 10.48, SD = 2.15) went down again in test 5. Although their preparation score patterns improved from test 6 to 8, their in-class test results did not alter significantly. In the latter two exams, the pattern appeared to be negative, with students' practice scores increasing while their in-class test scores decreased from test 9 to 10. The means of students' practice and in-class test results for ten weeks are depicted in Figure 6 below.
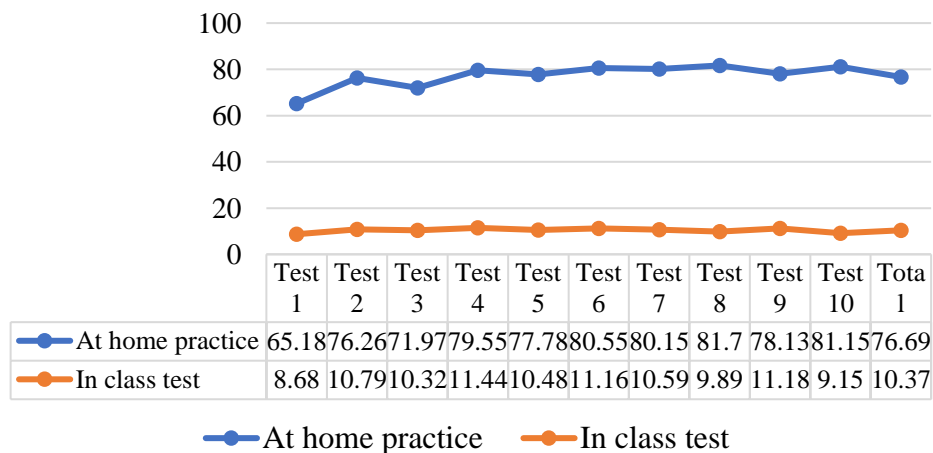

	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7	Test 8	Test 9	Test 10	Total
At home practice	65.18	76.26	71.97	79.55	77.78	80.55	80.15	81.7	78.13	81.15	76.69
In class test	8.68	10.79	10.32	11.44	10.48	11.16	10.59	9.89	11.18	9.15	10.37

Figure 6. The Means of Students' Practice and in Class Test Scores in Ten Weeks

Research Question 1 - Correlation

The first research question uncovered whether student vocabulary practice using *Quizizz.com* in an asynchronous mode outside the classroom had correlations with their test scores in class. The results of the bivariate correlation disclosed that students' total practice scores were closely associated with their total in-class test scores ($r = .42$, $p < .001$). The effect size of this correlation was large ($r^2 = .17$). In each test, students' practice scores were significantly correlated with their in-class test scores: practice 1 and test 1 ($r = .30$, $p < .001$), practice 2 and test 2 ($r = .27$, $p < .001$), practice 3 and test 3 ($r = .31$, $p < .001$), practice 4 and test 4 ($r = .24$, $p < .001$), practice 6 and test 6 ($r = .12$, $p = .01$), practice 7 and test 7 ($r = .14$, $p < .02$), and practice 8 and test 8 ($r = .13$, $p < .02$). In these mentioned tests, it can be assumed that students' in-class test scores were in line with their practice scores in *Quizizz.com*. Nonetheless, correlations were not observed in practice and test 5, 9, and 10, implying that students' practice in *Quizizz.com* at home did not have any significant effects on their in-class tests.

Research Question 2 - Differences

Across gender, female students scored significantly higher than their counterparts on vocabulary learning practice in the asynchronous mode ($t (298) = -2.49$, $p = .01$) with medium effect size (*Cohen's d* $= (77.4 - 71.35) / 13.08 = 0.5$), which resulted in higher scores in their vocabulary test in class ($t (298) = -2.72$, $p = .01$) with medium effect size (*Cohen's d* $= (10.46 - 9.71) / 1.51 = 0.5$). Nevertheless, there were no significant differences between Nursing and Medical Technology students on their practice scores on *Quizizz.com* ($t (298) = 1.92$, $p = .06$) and in-class test scores ($t (298) = .77$, $p = .44$).

Research Question 3 - Predictive Power

Multiple-linier regression was performed to examine the predictive roles of student vocabulary learning and practice at home with a gamified quiz integration on their vocabulary test in class. In total, students' practice scores in the asynchronous mode significantly predicted their in-class test scores ($F (1, 299) = 64.02$, $p < .001$). The asynchronous mode quiz results could explain 18% of the outcomes in students' in-class vocabulary tests ($R^2 = .18$). However, the effect size was small ($f^2 = .22$). Moreover, students' practice scores in the asynchronous mode were noticed to be significant predictors for the respective in-class tests, including test 1 ($F (1, 299) = 29.89$, $p < .001$, $R^2 = .10$), 2 ($F (1, 299) = 22.37$, $p < .001$, $R^2 = .07$), 3 ($F (1, 299) = 31.19$, $p < .001$, $R^2 = .10$), 4 ($F (1, 299) = 18.22$, $p < .001$, $R^2 = .10$), 6 ($F (1, 299) = 11.94$, $p = 001$, $R^2 = .04$), 7 ($F (1, 299) = 5.86$, $p = .02$, $R^2 = .02$), and 8 ($F (1, 299) = 5.32$, $p = .02$, $R^2 = .02$). Nonetheless, students' practice scores at home failed to predict their in-class tests 5, 9, and 10.

Discussion

The primary objective of this research was to see how gamified vocabulary learning in an asynchronous mode affects students' vocabulary learning outcomes in class. The first research question investigated the links between student performance in asynchronous online quizzes and their performance on a classroom vocabulary test. The overall practice scores of students on

Quizizz.com's online gamified quizzes were found to be favorably connected with their total in-class vocabulary exams. These findings back up prior research that found a link between gamified vocabulary practices outside of the classroom and in-class vocabulary assessments (e.g., Abrams & Walsh, 2014; Chen et al., 2019; Zou et al., 2019). Although *Quizizz.com* was not created expressly for vocabulary study, the gamified components appeared to help students' vocabulary learning, as seen by the tight correlations between asynchronous mode scores and in-class learning outcomes. Following previous research (Li et al., 2014; Tchakounté et al., 2020; Zichermann & Cunningham, 2011), these findings suggest that online gamified quizzes can help improve traditional vocabulary teaching methods, increase learners' lesson participation in an asynchronous mode of learning, and improve students' learning outcomes in class.

Second, female students outperformed male students in both asynchronous mode and in-class assessments in both vocabulary learning and practice, despite no differences in academic major. Generally, since gamified learning incorporates game-like elements such as reward, point, and a top-scoring leaderboard in educational settings (Seaborn & Fels, 2015), it is natural to think that male students will prefer this style of learning. Nonetheless, the study's second results have shown that this is not the case. Meanwhile, the amount of related research on the effects of academic majors is currently limited. Because the students majored in a health-related profession, it was assumed that substantial variations in their vocabulary learning outcomes would appear comparable in this study. In contrast, if the students majored in a completely different field of study, such as nursing and engineering, this study would expect considerable disparities. Students with similar academic degrees may have similar features, which may result in different vocabulary acquisition outcomes. Moreover, these significant differences could also mean that online gamified quizzes can play a crucial role in formative assessments (Topîrceanu, 2017). The quizzes support teachers to elicit students' knowledge and trace their emotional and cognitive traits through game elements such as, scores, badges, ranking, record of achievement, and leader board (Goksun & Gursoy, 2019; Shafie & Abdullah, 2019), which suit female students' vocabulary learning characteristics.

Then, the study's final finding revealed that students' performance in online gamified quizzes could predict their vocabulary test scores in class. Previous research that has confirmed the benefits of integrating gamified asynchronous vocabulary tests have solely looked at *Quizlet* (e.g., Dreyer 2014; Runhaar et al., 2012). As a result of these third findings, different online gamification applications may have comparable effects on students' vocabulary learning outcomes; the frequency of students' synchronous learning practices can correspondingly elaborate their vocabulary learning outcomes in class. Nonetheless, the findings of this study revealed that students' synchronous practice scores did not always correspond with and significantly predict their performance on a class test. This study reveals that there may be some impacts induced by student motivation and a difference in difficulty level between *Quizizz.com* and in-class test questions. It is normal to admit that learning English vocabulary can be tedious to some extent owing to the necessity for memory and repetition because the words must be learned and employed in productive abilities such as writing and speaking. Students in this research learnt 500 academic terms at CEFR levels A2-B1 over the course of ten weeks. This extended duration of vocabulary study appears to have influenced students' learning outcomes as well. There is also a study on non-significant differences in learning outcomes between the

gamified class and the standard face-to-face vocabulary education class in this case (Rachels & Rockinson-Szapkiw, 2018). Therefore, despite the benefits it might provide, particularly in terms of learning delight and fun, gamified vocabulary learning may reflect oscillations in students' learning outcomes when evaluations are undertaken weekly.

Furthermore, the findings of this study, particularly those which suggest that the performance of students in online gamified quizzes may be able to predict their vocabulary test scores in class, are in accordance with previous studies. For instance, Castro and Kimhachandra (2019) investigated the effects of utilizing gamification, namely *Quizizz.com*, for the purpose of enhancing the amount of English medical vocabulary that nursing students in Thailand were able to acquire. The intervention was carried out over the course of 10 hours in total (2 months). The results of the paired-sample t-test showed that there was a notable difference, with post-test scores being considerably higher than pre-test levels, and students expressing good views towards the gamified quiz. Moreover, in previous empirical investigations, a gamified quiz has been advised to reduce test anxiety and boost test performance (Pitoyo, 2019; Tchakounté et al., 2020). This is due to the fact that gamification is associated with increased engagement and enjoyment.

Implications and Limitations of the Study

The findings of the study have at least two pedagogical implications. Firstly, formal English vocabulary learning instruction at schools and universities should include gamified vocabulary quizzes applied in an asynchronous mode of learning. As elaborated earlier, empirical studies have pointed out that EFL students must acquire a certain number of words to function in English language (Laufer & Ravenhorst-Kalovski, 2010; Nation, 2006; Rofiah & Waluyo, 2020; Schmitt, 2007); however, class hours are simply limited while other lessons need to be taught in class at the same time. Therefore, English teachers can utilize online gamified quizzes, such as *Quizizz.com*, to create questions containing the target words that students are learning. Students can access and do practices anywhere and anytime within a period, e.g., a week. Nevertheless, this type of asynchronous learning requires an evaluation system, which may involve in-class tests; tasks or activities that require students to utilize the target words which they have learned asynchronously, such as, role-play, can also be applicable (Waluyo, 2020b). An evaluation system is essential for it enables teachers to assess the results of students' asynchronous learning.

The second pedagogical implication is that asynchronous gamified vocabulary learning mode can serve as a learner vocabulary training venue and supports the growth of learner autonomy in vocabulary learning if formal vocabulary learning incorporates online gamified quizzes. Students have traditionally found it difficult to learn L2 vocabulary, and their performance is typically determined by their degree of autonomy in vocabulary learning (Agustin-Llach & Alonso, 2017). Learner autonomy refers to a student's ability to direct their own learning process to achieve learning objectives, which leads to the development of lifelong learning abilities (McDevitt, 1997). Learner autonomy does not develop on its own, and progress is dependent on teachers' assistance in teaching pupils how to study alone in the early stages of learning. In recent years, online websites, and mobile applications, such as *Quizlet*, have appeared to be among the possible applications for enabling the increase of learner autonomy in

vocabulary learning (Cunningham, 2017; Pratiwi & Waluyo, 2022) and the current study also found that *Quizizz.com* can aid in generating positive results when employed in asynchronous gamified vocabulary learning.

As comprehensive as this research is, it does have some limits that must be noted. A quantitative research design was used in this study. Due to the disparities in total scores between gamified online quizzes and in-class quizzes, the data analysis process might be processed. Nonetheless, we assured that the quantitative analyses were conducted in accordance with statistical methods and circumstances. Moreover, the inclusion of qualitative data could have provided more valuable insights into students' personal experiences during the learning time.

CONCLUSIONS

This research discovered that gamified vocabulary acquisition in an asynchronous manner can be a viable alternative to overcome hurdles in vocabulary learning and teaching, particularly the problem of class-hour constraints. Asynchronous gamified vocabulary acquisition has been proven to considerably aid students in learning the target words; however female students appear to have a superior learning outcome. With the recent surge in interest in online learning, this method of instruction is both feasible and beneficial in terms of vocabulary acquisition. Gamified English learning has gradually changed the landscape of vocabulary learning over the last decade (Panmei & Waluyo, 2023). It has the potential to turn vocabulary learning instructions into a joyful and enjoyable learning environment while maintaining the old tactics of memorizing and repetition. Individual and group learning methods are also possible with gamified vocabulary learning. Teachers can also use an online gamified quiz platform like *Quizizz.com* to automatically limit the length of time students spend learning. The findings of this study should not be generalized to other contexts unless the participants share similar characteristics. Future research should focus on how many of the target words learnt in asynchronous gamified learning mode are employed in students' real-life interactions and communications in English. To generate more insightful results, a mixed-method study approach is strongly recommended.

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