

## **Mobile Assisted Vocabulary Learning (M Learning): A Quantitative Study Targeting ESL Pakistani Learners**

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### **Abstract**

This study investigated the impact of an online mobile game Kahoot on English vocabulary learning of undergraduate students and establish how mobile game-based technology aids in improving the English vocabulary skills. An experimental design helped to determine the influence of the mobile game intervention on the learning process over the traditional paper-based English vocabulary learning method. Following a pre- test/post-test design, sixty undergraduate students from two classes randomly divided into a control and an experimental group participated in the present study. Each group contained 30 students who either used conventional paper-based methods or vocabulary learning mobile game over a period of six weeks. The findings of this study statistically analyzed via independent t-tests at the end of the experimental period indicated that students using the mobile game Kahoot had greater achievement in learning vocabulary than those using the traditional method in learning vocabulary. So, it would be essential to create an awareness among the educators that the use of the new smart phone gaming technology can be an effective tool for teaching and learning new vocabulary.

**Keywords:** mobile assisted language learning, vocabulary learning, ESL learners, language skills

### **Introduction**

The general assumption that learning only takes place in a traditional classroom setting with a trained teacher has prevailed for many centuries. However, educationists and scholars in the 20<sup>th</sup> century (Argyris & Schon, 1974; Freire, 1972) have advocated the need to shift learning practices outside the typical classroom settings. Unfortunately, the mobility aspect of learning was not given due attention at that time. With the exponential growth in scientific technology, the digital systems have now entered the educational domain when learning takes place with the aid of multimedia, laptops, Ipads etc. In this scenario, the most recent invention of smart phones has replaced E-learning with M-learning (Mobile learning). MALL or mobile app software, a relatively new area of computer-assisted language learning (CALL), has really attracted English language practitioners all over the world (Zhang, Song, & Burston, 2011). It has become famous in the Second Language Acquisition (SLA) research, where with the enhancement of new mobile technologies, learning is developed in portable, social, and contextual scenario (Kukulska-Hulme, 2009). As per Chinnery (2006), smart phone usage in the educational context is gaining awareness with each passing day, benefitting L2 learners with real-time, contextual learning opportunities, which computers might not be able to offer.

Vocabulary learning is known as one of the main challenges second and foreign language learners confront during the process of learning a second language. Mobile technologies might be used to aid learners attain quite a lot number of words they need to learn (Hulstijn & Laufer, 2001; Nation, 2001).

This mobile learning trend has resulted in numerous MALL studies that have investigated its effect on diverse language learning outcomes (Burston, 2014). L2 vocabulary learning is the most frequently selected skill to have been explored in the current MALL studies (Burston, 2015; Darmi & Albion, 2014). These studies varied in terms of the target words, the number of words delivered via MALL, and the measurements.

Richards (2010) associated traditional methods of learning vocabulary with substitution drills, memorizing dialogues, directed speaking and writing practice and question/answer practice. The emphasis lies on rote memorization rather than to learn the usage of words in various contexts. Bromley (2007) considered these traditional methods as outdated mode of communication where it is difficult for teachers to achieve the proposed objectives and anticipated goals for vocabulary acquisition. Excessive use of dictionary to search meanings, teacher explanation and definition writing can hinder students to learn new words and may lead to lesser learning or understanding (Bromley, 2007). There was a need to have research where students were provided with scholastic magazines to familiarize them with new vocabulary items in specific context (Kelley, Lesaux, Kieffer, & Faller, 2010).

There is little understanding of different methods and techniques of teaching English language amongst teachers in Pakistan and these teachers are unaware of what methods can be employed for vocabulary building in Pakistan (Iqbal, Hassan & Ali, 2015). Gujjar et al. (2010) have mentioned that in Pakistan, the duration of teaching practice is very short and students consider themselves to be bound to only teaching lessons rather than doing other activities for active learning. It shows the monotonous side of teaching practice and teaching methods in Pakistan due to which students are unable to develop their vocabulary efficiently. Nevertheless, Jamil, Majoka & Khan (2014) and Rahman (1990) have regarded English language having an important position in Pakistan as it has an official language status. Hence there is a need to develop new methods of teaching which

introduce learners to new technological tools in learning, ultimately making them independent learners.

The study thus aims on the effectiveness of using smart phone in teaching lexical items to the undergraduate Pakistani learners, where the medium of instruction is English. It will help learners to learn and use English language through utilization of digital game-based mLearning, which is not given due importance in Pakistan until now.

### **Literature Review**

Game-based learning refers to a learning approach in which games with well-defined learning objectives and outcomes are incorporated. The subject matter is balanced in accordance with the rules and regulations of the game and the learner's capability to retain, practice and apply that subject matter to practical life situations (Benoit, 2017). To increase English vocabulary, enable active learning and enhance interest and motivation in learning, mobile game-based learning methods can be implemented in an ESL or EFL educational setting (Ryu & Parsons, 2009). Digital game-based learning is characterized by the integration of various multimodal features such as text, images and voice. Learning via mobile games can enhance learners' mutual relationships, creativity, interest and attention more efficiently. In addition to that, games are designed with a particular set of rules, regulations and objectives. This helps in attaining physical and mental gratification that in turn enable the learners to achieve their leaning goals (Burguillo, 2010). Many researches have been conducted so far on mobile game-based learning in various fields (Liu, 2014; Liu et al., 2011; Miller et al., 2012; Shih et al., 2010; Vos et al., 2011). A study reported that instructional games are commonly practiced at elementary level but its inclusion and progression in secondary as well as high school level is still slow in making them recognized as influential learning tools (Finstad, 2010).

Marzano (2009) studied the effects of incorporating a variety of mobile games to instruct explicit vocabulary. He observed 24 elementary educators who implemented a six-step vocabulary instructional design in their classrooms. Positive results revealed that a strong effect is produced when the students are engaged in games offering non-threatening ways of learning new words (Marzano, 2009). Ragatz (2015) proclaimed that a classroom ought to be a place where students feel enthusiastic and excited to learn new things, where learners desire to spend their time and come again repeatedly, and where teachers design motivating lessons for students. Ragatz observed that mobile game-based learning increased learners' motivation and eagerness to learn and comprehend lexical items. Moreover, games also helped in long-term retention of vocabulary items and made it easier for students to implement their knowledge in other contexts (Ragatz, 2015). Results of another study by Liao & Chen, (2012) also reported that mobile games helped undergraduate students to learn and retain lexical items. Vahdat & Behbahani (2013) executed video games in classrooms for English language learners. The participants aged 23-27 were distributed equally into two groups. The control group was presented vocabulary items with traditional instructional methods while the experimental group received new word with video game. Results showed that video game learning caused significant improvement in post-test scores over conventional teaching practices. Another study also employed mobile games to fifth graders at an elementary school in Jordan by Al-Sharafat & AbuSeileek, (2012). The participants were enrolled at school as EFL learners. Finding showed that the retention rate of game-based group with respect to vocabulary learning was comparatively higher than the other group. Exposure to digital online games covered

learning via synonyms, antonyms, word searches, recognition and context. Similar results were reported in another study by Taheri, 2014) where 32 female elementary learners were taught vocabulary with video games. Experimental group with game-based learning scored higher in engagement, motivation and vocabulary retention. It was concluded that games proved to be a valuable English learning tool for second language learners. Ahn & Lee (2016) constructed a mobile game to help EFL university students who were enrolled in basic English courses to practice English vocabulary. The results showed that most students had positive attitudes and satisfaction towards game-based learning in the classroom. The finding demonstrates that game-based learning systems can support EFL lexical instruction. In addition, Chen & Yang (2013) used the video game BONE to teach vocabulary to EFL students. They found that the students generally believed that game-based learning could effectively improve their English learning skills and motivation, and that most of the students enjoyed learning English vocabulary through games. W.-Y. Hwang et al., (2016) constructed an English vocabulary passing game on smart phones. They demonstrated the convenience and practicality of the devices, which enabled learning to become a part of life. The results revealed that game-based learning can effectively increase interest in and motivation for engaging in English learning, which consequently enhances English vocabulary knowledge. Smith et al., (2013) constructed a game-based English vocabulary learning system on e-books and experimentally demonstrated that their interactive e-book game design increased the motivation for engaging in English learning. The findings demonstrate that learners gained more vocabulary through the game as compared to traditional classroom learning. Yip & Kwan (2006) conducted a study and found that using video games to teach in the classroom could capture learner's attention better than traditional methods. This in turn may lead to better vocabulary acquisition if the online games are used for vocabulary instruction. The study focused on 100 students who used web-based vocabulary instruction that included games. They found that after learning vocabulary with the websites that included games, the experimental group outscored the control group on the vocabulary post-test.

In the current study, the online learning game in the form of Kahoot was used as mobile assisted tool to evaluate the performance of a learner regarding vocabulary learning. It is repetitive and can be played again and again. Moreover, it also resembles to a virtual word wall as the lexical items can be displayed on the smart board clearly and prominently (Dellos, 2015). One possible drawback of the popularity of Kahoot is the concern that students will begin to get bored of playing the game (A. I. Wang, 2015).

Following is the main research question of the study:

1. How significant are the differences between vocabulary knowledge of undergraduate students who engage in learning vocabulary with and without the use of mobile game Kahoot?

## **Theoretical Framework**

### **Vygotsky's Theory of Zone of Proximal Development (1980)**

One-way knowledge construction through mobile device is grounded upon Vygotsky's Theory of Zone of Proximal Development. The theory emphasizes the space that lies between the actual

problem-solving stage and the stage that can be attained via support and guidance (Vygotsky, 1980).

When broken down into three stages, this theory looks into what a learner is able to do unaided, the stage he desires to attain and the guidance essential to reach that stage. The first level is termed as independent. It relates to the learner's existing skill level and knowledge whereby he feels contented as he can easily achieve success and solve problems independently i.e. without anyone's support. The next stage is the one where lies the zone of proximal development. Through collaboration and guidance, the learner can do something which is beyond the stage where he is able to accomplish the task on his own. But such a task is not hard enough to create boredom or confusion (Murray & Arroyo, 2002; Vygotsky, 1980). The eventual purpose of the support given to the learner is to evoke and build up his background knowledge, so that he can later complete the tasks on his own at a later stage. The third level is referred to as frustration. This stage occurs when a learner tries to move outside his existing level of knowledge with no suitable support and guidance. From this, it can be understood that mobile phones let the users to work on their own while in the zone of proximal development.

Playing games on mobile phones let the learners move a step ahead of their present skill level; wherein the mobile phone act as a scaffold (Ganske, 2013). When vocabulary games are played on mobile phones, the players are presented with unfamiliar words via instructions and guidelines. Though these words are beyond the present knowledge base of the learners, yet within their grasp. Then provides learners to interact with these words; ultimately leading to the attainment of knowledge of the lexical items. Ganske (2013) asserts the fact that though it is important to introduce knowledge within a specific discipline, but encouraging students to solve problems that requires them to go beyond their existing level of knowledge and skill is much more crucial to effective teaching. The same can be applied to vocabulary learning with the aid of mobile device where the game is designed in a way that provides support to the player starting with his current knowledge level. These scaffolded experiences let learners advance beyond their current knowledge level and move them a step ahead of what they were before. Slowly and gradually, the scaffolds are decreased and finally stopped with the learner now being capable to incorporate the knowledge attained with guidance into situations without any guidance (Chaiklin, 2003; Murray & Arroyo, 2002). Eventually, the aim of the learner is to gain knowledge self-sufficiently and independently on a certain topic. To conclude, the Zone of Proximal Development involves learners at an ideal pedagogical level safely and supportively.

### **Thorndike's Theory of Law of Effect**

Thorndike's theory of law of effect is constructed upon picking and selecting the route of minimum resistance towards a goal that consequently leads to utmost satisfaction (Thorndike, 1905). This theory explicates that actions are altered depending on the experiences and their results (Thorndike, 1913). Trial and error learning illustrates this theory in the best possible manner (Simpson & Stansberry, 2009). Mobile gaming provides repeated opportunities to the player to perform an activity. It means that if in the first attempt, the player's strategy went unsuccessful or ineffective in earning the most points or achieving the target, the player can attempt it again and again with modifying the original behavior each time on the basis of instant and immediately received feedback. Thus, the goal is to feel maximum level of satisfaction while completing the task or activity (Thorndike, 1913). Ericksen (1974) explains that reward or punishment is given to the

learner based on his actions whereas the effect of satisfaction or annoyance is entirely reliant on the way in which the learner reacts to the outer environment. The collaboration provides ample opportunities to the learners to explore and try out different possibilities or actions so as to be rewarded or punished depending upon the decisions made. This ultimately leads to an increment in motivation level as well as attention that may be exhibited by learner during game play (Ericksen, 1974). When the learner becomes familiarized to the principle behavior behind efficient learning via integration of negative and positive reinforcements, he can apply the same knowledge to study in new settings (Blachowicz & Fisher, 2008). Thus, online mobile gaming simply termed as gamification might open up new horizons of educational learning.

### **Methodology**

The researcher used the pretest-posttest experimental research design. Quantitative approach was employed because it is best suited to analyze and interpret statistically oriented researches. Moreover, the quantitative approach directly relates to the objectives and research questions of the study. The statistical analysis is supposed to provide more accurate and authentic findings of the proposed questions.

### **Sample**

Participants of this study were 60 undergraduate students aged 18-23 who were currently enrolled in BBA degree. They were engaged in an English language course to learn business communication skills. Random sampling was used to divide the participants equally into two groups. The vocabulary acquisition program was analyzed in terms of efficiency and effectiveness with and without the inclusion of an online vocabulary learning mobile game Kahoot for six weeks, twice a week during class timings. The study includes undergraduate students at COMSATS University Pakistan, where majority of the students own a smart phone and are allowed to use it inside the classrooms for educational purposes. Moreover, the researcher had access to the Institute and the administration to seek permission for the conduction of research.

Demographic survey was administered to gather general information about each participant at the beginning of the study. The questions were designed to collect the participant's basic demographic data like age, gender, degree and course in which they are currently enrolled, primary language and previous exposure to GRE preparatory classes or study material. The participants were also asked if they own a smart phone, their familiarity with the smart phone, frequency of use, prior exposure to educational games and awareness of mobile game Kahoot. All of them speak Urdu as their primary language. None of them had previously taken the GRE test. They had never taken GRE preparatory classes or purchased any GRE study material. However, all of them owned a smart phone. Out of 60 students, 41 stated that they use mobile phones very frequently and are very comfortable with it. 16 were frequent users and hence comfortable with the usage of smart phone devices. However, 3 students reported themselves as neutral users. 11 out of 60 students stated that they had played an educational game ever in life but it was other than the game Kahoot. Moreover, all the students had an internet facility on their smartphones and majority of them (n=44) could only avail it at home via USB devices.

### **Variables**

The dependent variable is vocabulary learning, where pre-intervention and post-intervention data collection points was compared amongst the two groups. This data was intended to establish the effect of vocabulary learning through mobile game, particularly relating to their learning process in vocabulary acquisition. The participants were divided into two groups, the control group and the experimental group. The experiment was run for six weeks, two times per week. During this time, the students followed the program prescribed to them to see whether there was improvement of their vocabulary acquisition. the independent variable was the method of instruction to facilitate in the teaching and learning process of the two groups. The method category included the use of traditional paper-based instruction with notes and lecture for vocabulary acquisition for the control group; while the use of Kahoot as mobile gaming intervention for vocabulary instruction of the experimental group.

### **Instrument**

A pre-/post-test was developed by the researcher and reviewed by two experts as well as the classroom teacher. A 60-item vocabulary test was given to the students as Pre-test. The test contained synonyms in the form of multiple choice questions with four options and students were asked to answer it. The test was made from **Barron's GRE High-Frequency 333 Words**. According to Barron's book, these 333 words were considered to be the most frequently used lexical items in International GRE test. The test measured vocabulary learning scores of the participant groups. The post-test was identical to pre-test in that it contained all those sixty items but in a randomized manner.

A daily data form or log form was created by the researcher to keep a track of participant's progress. The researcher filled the form by the end of each study session on daily basis. The study log recorded the student's daily progress by filling in the amount of time studied, where studied, number of new words mastered, and final scores on the mini-test.

### **Technology intervention by using Online mobile learning game Kahoot**

The online learning game Kahoot evaluates the performance and development of an individual through assessment scores. It is repetitive and can be played again and again. Pede (2017) listed Kahoot as one of the top 100 new online apps to use in the classroom. Kahoot came in at number 36 on the list of apps rated for their effectiveness and usefulness for teaching or assessing students in the classroom. The learning app Kahoot provides opportunity to the learners to play each game with its own distinguishable feature of modality. The greatest advantage of the game is that it does not need any subscription charges and is entirely free for everyone-be it teachers or students. However, the only requirement of participation is to have a multimedia tool (Siegle, 2015). A mobile phone, Chromebook or laptop can run the Kahoot website. Instructors create game-based quizzes and surveys in Kahoot that can be joined by the learners collectively through a game pin code. The quizzes are based on multiple choice questions with four possible options and may also contain various audiovisual aids or aviate in the form of images or videos. On top of the number of answer choices, Kahoot also provides teachers with the ability to select the amount of time that the students have to respond to each question (Siegle, 2015). Answers pertinent to the questions displayed on the smartboard can be selected by the learners on personal devices such as smartphones (Johns, 2015). Students are not bound to sign up necessarily with an account username to play the games (Dellos, 2015). To assure confidentiality, learners are also able to create their

nicknames that will be displayed throughout the game (Johns, 2015). If a name is inappropriate, the teacher can simply click on the name and the student is kicked out of the game (Siegle, 2015). It also allows the inclusion of visual aids like pictures and videos to increase interest, motivation and engagement of learners (Dellos, 2015). The more a student answers questions correctly and quickly, the more he can earn good points. The game provides immediate feedback to the players through an online scoring system. For the purpose of this study, Kahoot was launched in private beta at the third annual SXSWedu in March 2018. Prior to the start of the vocabulary acquisition program, the student vocabulary was tested to assess the level of their vocabulary prior to the program. After the six weeks program, the students were tested again to see if there had been any improvement in their vocabulary.

### **Procedure**

The researcher obtained a formal approval from the Head of the Department to conduct the research study. After getting permission, the following plan was followed for accomplishing the experiment. The experiment lasted for six weeks, 2 times per week which commenced and concluded with an evaluation (pre-test and post-test). Initially, the researcher gave a brief introduction of the research to both the classes. They were assured that their names would remain confidential throughout the experimental period. Their daily progress and results for the vocabulary pre- and post- test would be tracked and recorded with the help of their university registration number. The students were also made familiar with the use of instruments like how to complete a demographic survey, use worksheets for learning and play mobile game Kahoot. The features and functionalities of the game Kahoot were also discussed. A training session was also held with the teacher to ensure that the teacher would instruct the participants accurately according to the control and experimental group plan. Explicit directions were given to the instructor regarding the data conduction plan, the order in which the activities would take place, time period for the accomplishment of each activity and guidelines to implement each activity. The volunteers first signed an informed consent form before starting the experiment in order to ensure their willingness.

In order to check the validity of instruments used in the present study, a pilot study was conducted before the intervention of actual experimentation. The pilot study brought into focus any possible difficulties and hurdles that might come in a game-learning situation. It also helped in detecting the shortcomings of the selected mobile game, so the researcher might work to sort it out by certain modifications. The pilot study lasted for two weeks whereby initially 27 undergraduate volunteers participated in the study. The participants included in the pilot study were not allowed to participate in the actual study afterwards. Initially, an English Vocabulary Proficiency Test was taken. Results of this test ensured that out of 27 participants, 24 had an almost equal caliber with respect to vocabulary items as their scores ranged from 22-25. Three students scoring 32, 33 and 35 were excluded from the pilot study. The participants who got almost equal scores in the test were then randomly divided into two equal groups- a control group and experimental groups. After that, a Vocabulary Assessment Pre-test was administered to all the groups. The researcher chose only 32 words from the overall list that were taught to them within 2 weeks. The control group was taught vocabulary items through traditional paper-based instruction for 20 minutes twice a week. However, the experimental group was exposed to an online mobile learning game Kahoot for 20 minutes twice a week in the classroom. Therefore, the experimental group was exposed to the game



Kahoot in which the vocabulary items were supplemented by appropriate images. The images served as a clue to detect the meaning of those words.

The test contained synonyms and antonyms in the form of multiple choice questions. The test contained 60 synonyms in the form of multiple choice questions with four options. This test was made from Barron's GRE High-Frequency 333 Words. According to Barron's book, these 333 words were considered to be the most frequently used lexical items in International GRE test. The researcher chose only 120 words from the overall list that were taught to them within 6 weeks. The control group was taught vocabulary items through traditional paper-based instruction for 20 minutes twice a week with various activities. Subjects in this group were presented with a list of 10 words per day along with their meanings. Each word was also made clear with the help of sentences in which the words were being used. Other activities were also used in the traditional classroom which strategically helped in learning the same lexical items. These included defining the words using dictionary; reading words in sentences; writing sentences using each word; matching and fill in the blanks activities; crossword, puzzles and word search worksheets; and repeating words and definitions through drill. Hence, students get a chance to encounter similar vocabulary each day through different strategies.

The researcher created his own quizzes containing GRE vocabulary in a game-based format. The quizzes were then shared with the subjects before the commencement of each class. Each quiz was based on 10 multiple choice questions with four possible options and may also contain various visual aids or aviates in the form of images. To captivate learners' minds, increase engagement and enhance learning, the quizzes were designed on a variety of activities. These activities included guessing the synonym of a word; selecting the antonym of a word; clicking on the right word pertinent to the given definition with the help of images provided. Other activities used were vocabulary pictorial and sentence completion. In vocabulary pictorial, students were asked to tap on the correct vocabulary word represented by the picture while in sentence completion, learners had to complete the sentence with the appropriate vocabulary item. Using various strategies to teach same words each day helped students to learn, memorize and retain lexis easily.

In order to increase learners' attention, the researcher also selected the time limit of 20 sec per question in which the student was bound to answer each question, otherwise the game would automatically move to the next question. Answers pertinent to the questions displayed on the smart board were selected by the learners on their personal smart phones. Students were not bound to sign up necessarily with an account username to play the game. To assure confidentiality, learners were also able to create their nicknames that would be displayed throughout the game. The more a student answered questions correctly and quickly, the more he earned good points. One point was given for each correct answer. Students learn 10 words per day through this method. Students were asked to play the game twice or thrice within 20 minutes to master the lexical items. At the end of each day/session of the learning process, the learners were asked to take a mini-test by playing the synonym game one last time on their mobile phones in order to recall the meanings of the words learnt. The participants got immediate feedback and scores on the test automatically by the smart phones scoring board system on the same day. By the end of six weeks, a Vocabulary Assessment Post-test was administered to both the control and experimental group. This test was identical to the pre-test in that it contained all those 60 items but in a randomized manner. Then the scores of pre-test and post-test of both the groups were statistically compared to each other to know which group learnt the most. The researcher used experts in the fields of English Language. The researcher

plus two content expert reviewers participated in the Content Expert Review. To maintain independence of the reviews, both the reviewers were asked to conduct the reviews individually; the identity of one reviewer was not revealed to the other one except the author. The recommendations of both the experts were to exclude pictures from the test as they might help more to know the meaning of vocabulary item.

### Data Analysis

For the purpose of evaluation, the researcher used Independent Sample t-tests and Descriptive Statistics Analysis to answer the research questions. Independent T-test analysis was conducted to compare the post-test scores to find any significance between the experimental and control groups in vocabulary acquisition. The researcher used an alpha level of 0.05 as a standard in analyzing data. Reliability was examined for vocabulary test using an internal consistency procedure to calculate Cronbach's Alpha. According to Altman's Benchmark Scale (Gwet, 2014), an  $\alpha$  between 0.81 and 1.00 is very reliable. The vocabulary test showed high reliability (Cronbach's  $\alpha = 0.899$ ). All students in the experimental group and control group were taken to administer the pre-test to measure a baseline at the onset of the experimental period. The researcher created the vocabulary test of 60 words that match vocabulary content being taught in classrooms during the experimental period. The same comprehensive vocabulary test (Post-test) was administered to both groups of students at the accomplishment of the 6-week period of time to compare if a significant difference existed in their learning effectiveness. Each test item was scored 1 point for correct response and 0 point for incorrect response. Individual pre-test and post-test scores were calculated by summing each student's ratings. Once the students completed the tests, the researcher scored the results. The results were imported into EXCEL for analysis. The data was analyzed by using SPSS version 23 (IBM Corp, 2015).

### Results

Initial scores on the vocabulary pre-test for the students indicated that the students had acceptable initial knowledge of the content topics. Table 1 shows the pre-test average of the experimental group ( $M = 17.23$ ) and the control group ( $M = 17.10$ ). Table 2 shows the variance of populations are equal ( $p = 0.238$ ), as such the independent sample test assumes equal variances. Table 2 also shows no statistically significant difference in pre-test scores between students in the experimental group and control group [ $t(136) = 58; p > 0.05$ ], suggesting both groups had the same vocabulary level at the onset of the experimental period. As it appears both groups come from similar populations prior to treatment, the hypothesis can be tested regarding post-test scores to see if a difference between the two groups exists after the experiment was conducted.

**Table 1. Descriptive Statistics for Both Experimental and Control groups: Pre-Test and Post-Test**

	N	Minimum	Maximum	Mean	Std. Deviation
Pre-test Control Group	30	8	22	17.10	4.254
Pre-test Treatment	30	9	22	17.23	3.266

Pre-test Total score	30	22	41	34.33	5.701
Post-test Control Group	30	19	34	28.10	3.968
Post-test Treatment	30	37	51	44.50	3.848
Post-test Total score	30	59	84	72.60	6.473

An independent samples t-test was conducted to see if a statistically significant mean difference in post-test vocabulary levels between the experimental and control group exists. As Table 3 shows, the variance of populations for post-test scores are equal ( $p = 0.846$ ) the independent samples test will assume equal variances. Table 3 also shows a statistically significant difference does exist in post-test scores between students using the vocabulary learning game Kahoot and those that did not [ $t(58) = 16.249$ ;  $p < 0.05$ ].

**Table 2. Independent Samples t-test: Pre-test**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2- tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Score	Equal variances assumed	1.423	.238	-.136	58	.892	-.13333	.97913	-2.093	1.8266
	Equal variances not assumed			-.136	54.376	.892	-.13333	.97913	-2.096	1.8294

Table 4 shows the variance of populations for the difference are equal ( $p = 0.316$ ) and will be assumed in the independent samples test. As Table 4 shows, a statistically significant difference does exist in the difference between the pre-test and post-test scores among students using the vocabulary learning game Kahoot and those that did not [ $t(58) = 13.397$ ;  $p < 0.05$ ].

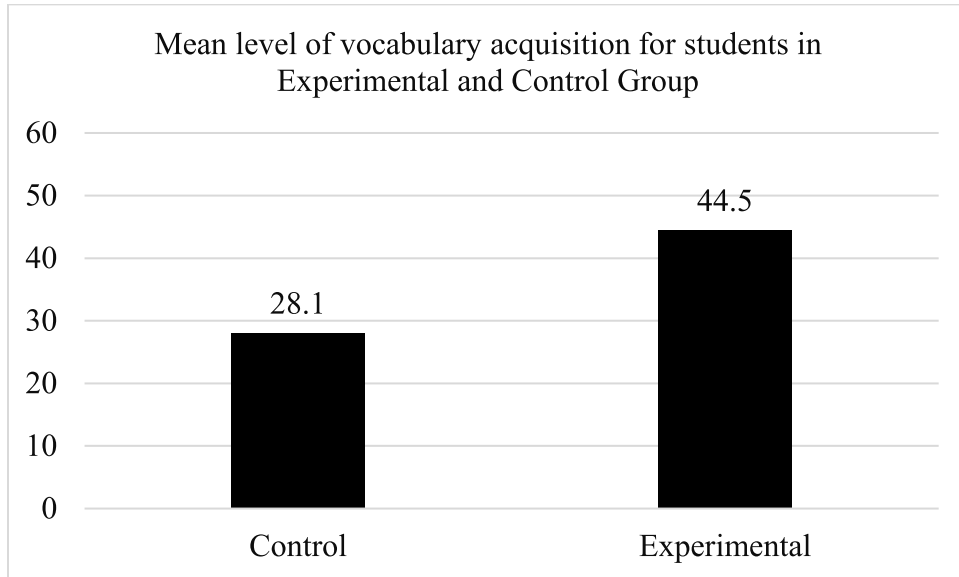
The groups show little difference at the beginning of the experiment, while showing statistically significant differences after the treatment. Furthermore, the result at the end of experimental period indicated that students using the vocabulary learning mobile game Kahoot had greater achievement in learning vocabulary than those using the traditional method in learning vocabulary.

**Table 3. Independent Samples t-test: Post-test**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	Df	Sig.(2- tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Score	Equal variances assumed	.038	.846	-16.24	58	.000	-16.4000	1.0092	-18.4202	-14.3797
	Equal variances not assumed			-16.24	57.945	.000	-16.40000	1.00927	-18.4203	-14.3796

**Table 4. Independent Samples t-test: Difference between the Pre- and Post-tests**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2- tailed)	Mean Differenc e	Std. Error Differenc e	95% Confidence Interval of the Difference	
									Lower	Upper
Difference	Equal variances assumed	1.025	.316	-13.39	58	.000	-16.26667	1.21422	-18.69	-13.83
	Equal variances not assumed			-13.39	57.02	.000	-16.26667	1.21422	-18.69	-13.83



**Figure 1:** Mean levels of vocabulary acquisition for students in Experimental and Control Group

The sample means are displayed in Figure 1, where students in the experimental mobile game-based learning group scored significantly higher on vocabulary acquisition than students in the traditional paper-based group (for experimental game-based group,  $M = 44.50$ ,  $SD = 3.848$ ; for traditional group,  $M = 28.10$ ,  $SD = 3.968$ ).

### **Discussion and Conclusion**

Students in the experimental group showed their ability and enthusiasm to interact with the new learning method that contributed positively to their achievement in learning vocabulary as compared to those using the traditional method of learning vocabulary in the control group. This suggests that the study's main goal of providing and engaging an effective approach to enhance learners' English vocabulary acquisition was achieved. This finding is consistent with findings from studies by Marzano (2009), Ragatz (2015), Liao & Chen (2012), Vahdat & Behbahani (2013), Al-Sharafat & AbuSeileek (2012), Taheri (2014), Ahn & Lee (2016), Papastergiou (2009), Chen & Yang (2013), W.-Y. Hwang et al., (2016), Smith et al., (2013), Yip & Kwan (2006) and Abrams & Walsh (2014), showing that the mobile game-based technologies is an effective approach for teaching vocabulary to ESL learners. The results of all these studies reported that students had greater achievement when they used digital game as a learning method to acquire English vocabulary. The mobile games used in the previous studies share some of the similarities with the game Kahoot; like the use of pictures and video. Thus, this study had similarly positive effects on students' learning and experiences.

This study discovered that the mobile game Kahoot simplified the teaching and learning English vocabulary acquisition by motivating students psychologically through images and instant feedback. The time limit of 20 sec per question enabled students to engage themselves the whole time as their behaviors on task changes with the expected learning activity. The researcher believes that the extended engagement and deeper engrossment with vocabulary through the mobile gaming experience was how the students remembered the new vocabulary. One explanation is that during

the gamified learning approach, students maintain eye contact with the gaming environment provided by smart phones, while students cannot make eye contact at all times with a real classroom teacher during the traditional method. Hence, there will be more attentiveness during the mobile game set as compared to what happens in the real classroom lecture with more than 30 students. Theoretically, the findings of this study advocate the theory of Vygotsky Theory of Zone of Proximal Development (1980) and Thorndike's Theory of Law of Effect. Students in this study improve their vocabulary retention when with the aid of mobile device where the game is designed in a way that provides support to the player starting with his current knowledge level and advance beyond their current knowledge level, moving a step ahead of what they were before. Slowly and gradually, they incorporate the knowledge attained with guidance into situations without any guidance (Chaiklin, 2003; Murray & Arroyo, 2002). Mobile gaming provides repeated opportunities to the player to perform an activity. It means that if in the first attempt, the player's strategy went unsuccessful or ineffective in earning the most points or achieving the target, the player can attempt it again and again with modifying the original behavior each time on the basis of instant and immediately received feedback. Thus, the goal is to feel maximum level of satisfaction while completing the task or activity (Thorndike, 1913). Reward or punishment is given to the learner based on his actions whereas the effect of satisfaction or annoyance is entirely reliant on the way in which the learner reacts to the outer environment. This ultimately leads to an increment in motivation level as well as attention that may be exhibited by learner during game play (Ericksen, 1974).

Contextually, the findings are beneficial for the students in Pakistan. Gujjar et al. (2010) have mentioned that in Pakistan, the duration of teaching practice is very short and students consider themselves to be bound to only teaching lessons rather than doing other activities for active learning. It shows the monotonous side of teaching practice and teaching methods in Pakistan due to which students are unable to develop their vocabulary efficiently. It thus helped learners to incorporate new ways of learning vocabulary through the use of technology like mobile phones.

### **Limitation and Recommendations for Future research**

For the future research, it would be useful to conduct a similar study taking into account the following considerations. Future research can increase the sample size to be at least  $N = 80$  instead of  $N = 30$  in each group to improve the accuracy and generalization of the outcome. It is recommended for future research to use different games, as it might provide different results in vocabulary acquisition, taking into account the game quality and application environment. Since this research was limited in using game-based technology to enhance English vocabulary acquisition, further research is recommended to address different vocabulary aspects, e.g., memorizing, pronouncing and spelling. Since this study has an experimental period of 6 weeks, the students were motivated to use the new mobile technology and that reflected positively on their degree of achievement. It would be of interest to examine their level of achievement over an expanded experimental period for more than 9 weeks to see if the degree of achievement will be maintained or reduced due to the novelty of the technology wearing off from prolonged use.

### **Pedagogical Implications**

This study pairs English vocabulary with an attractive mobile game-based environment where students can access meaningful content topics to facilitate English vocabulary acquisition. The

findings of this study suggest pedagogical implications for the teachers, ESL students and Curriculum designers. Teachers can make use of mobile phones as a teaching tool for vocabulary learning in language classroom. Training should be arranged for the language teachers to know how in different ways, mobile phone can be used and ensure that this tool would be used only for the learning purpose. Students can also use this tool for vocabulary learning, especially when they can download any game without any charges for the vocabulary learning purpose. It would be helpful in increasing their motivational level and reduce their level of boredom which they face in traditional vocabulary learning classroom. Curriculum designer should also include such vocabulary learning activities which can engage learners and reduce the level of guidance and work from the teacher's side.

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