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Effects of MALL Applications on Vocabulary Acquisition and Motivation

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Abstract

Mobile devices can induce increased vocabulary learning and enhanced motivation for vocabulary acquisition by encouraging ubiquitous learning via their portability and access to various activities. The purpose of this study was to explore the benefits of mobile phone applications with regard to their potential for improving vocabulary learning and motivation. Learning theories and cognitive techniques were explored to provide a theoretical foundation for this study. Following a pre-test/post-test design, 27 experimental students and 31 control students participated in this study by using mobile device-based vocabulary applications thrice a week over the course of one semester. The results indicated statistically significant differences in performance between the two groups in post-test scores and increases in the post-test scores of the experimental group indicating enhanced vocabulary learning. A motivation scale was employed to measure the motivation of the participants in both groups at post-test. The results indicated that experimental participants had enhanced motivation perceptions compared to the control participants. While further research is needed, the analysis of data indicates that the use of mobile phones is a viable vocabulary instructional/learning method at the college level. The paper ends with pedagogically informative conclusions, recommendations and implications for teaching and research.

Keywords: Computer-Assisted Language Learning, Digital Texts, Human-Computer Interaction, Learners- Attitudes

Introduction

Since the early 1990s, technology has revolutionized teaching and learning milieus and aids across disciplines via scaffolding, assisting and supplementing traditional classroom learning materials and activities. In addition, the ubiquity of the internet has made these technologies more efficient in revolutionizing language pedagogy. As these newly touted technologies for foreign language learning and teaching have waxed and waned, and as professional concerns have shifted between areas and technologies, the field of computer-assisted language learning (thereafter CALL) has begun to develop a scientifically and empirically grounded basis for emerging research in English Language Teaching (thereafter ELT). CALL is a discipline whose insights have historically been largely anecdotal and idiosyncratically descriptive, but this discipline has been shaped over the past two decades by attempts to statistically validate the claims of classroom practitioners and the postulates of ivory-tower theoreticians infatuated with the touted advantages and merits of CALL.

The change in focus regarding technology-assisted language learning and teaching has yielded two significant results, one positive and one negative. On the positive side, the introduction of CALL into language classrooms has vastly increased our professional knowledge about "what works" in specific settings and conditions via the mushrooming plethora of research that has been conducted in the field. On the other hand, the insights yielded by currently practiced CALL research have become incomprehensible to many, if not most, classroom practitioners. Another disadvantageous corollary is that technology swiftly becomes obsolescent. Both researchers and practitioners are constantly racing to catching up with the current state of research (Aldosari & Mekheimer, 2013).

Recently, a new generation of CALL has come into active existence; namely, integrating mobile assisted language learning (thereafter MALL) technology (via personal multimedia players, cell phones, and handheld devices) has recently invaded the foreign language curriculum because MALL technologies are convenient, easy-to-use and accessible on devices that are malleably suitable for use in higher education institutions (Abdous, Camarena, & Facer, 2009; Oblinger & Oblinger, 2005; Kukulska-Hulme & Shield, 2008; Kukulska-Hulme, 2009; Shih, 2007; Nah, White & Sussex, 2008).

Redd (2011) aptly observed that learners are presently equipped with mobile technologies "in the palm of their hands" with which they can "embark on the use of tools that can expand their content knowledge" (p. 1). Ching, Shuler, Lewis, and Levine (2009) concur in this regard and state the following:

> "Mobile technologies can help advance the goal of achieving digital equity because of their ubiquity, low cost, and familiarity. The anytime, anywhere availability of mobile devices also has potential to promote a seamless 360-degree learning experience that breaks down the barriers between formal and informal educational environments" (p. 28).

Mobile phones and other related digital devices such as tablets, iPads, iPhones and personal digital assistants (PDAs) belong to the category of smart phones and have become so pervasively popular that, according to the U.N. Telecom Agency Report, more than 6 billion

people are currently mobile phone subscribers. This report indicates that 2.3 billion people, or approximately one-third of the world's 7 billion inhabitants, were internet users at the end of 2011, and this number is likely to increase in coming years, although there is a strong disparity between rich and developing countries. Given the ubiquity of mobile devices and internet connectivity, smart phones, and their innate pedagogical potential, are becoming pervasive, indispensable, and most likely inevitable digital tools that are currently commonly adopted (Cui & Wang, 2008; Hsu, Hwang, Chang & Chang, 2013; Lari, 2012; Taki & Khazaei, 2011; Zhang, Song & Burston, 2011).

Additionally, given this boom in technology, language researchers and educators have claimed that some aspects of language acquisition, such as vocabulary, can be mediated through digital tools such as connected mobile devices. Given the global emphasis on the development of 21st century skills, researchers and teachers need to explore new, digital means of teaching vocabulary. The purpose of this study was to explore an alternative method of vocabulary instruction that utilized smart phones (mobile devices, iPhones, tablets and SIM iPads) in comparison with the traditional method of vocabulary instruction. The research question underlying this study was the following:

What are the effects of smart phones on EFL college learners' vocabulary learning and motivation?

This question was followed by the following two sub-questions:

1. What are the effects of mobile devices on inducing and maintaining vocabulary learning?
2. How does vocabulary learning via mobile devices enhance motivation towards MALL-based vocabulary learning?

Hypotheses of the study

The hypotheses of the present study were as follows:

1. Students who are taught according to a mobile-based experimental method will score higher on post-tests than on pre-tests of vocabulary learning.
2. Students who are taught via an experimental method employing mobile applications will score higher than the control group on vocabulary learning upon post-testing.
3. Students who are taught according to a mobile-application-based experimental method will show enhanced motivation for MALL-based vocabulary learning compared to control participants at post-test.

Literature Review

Research on vocabulary acquisition in Computer-mediated Communication (CMC) settings is well established and promising in terms of the technology's abilities to increase the effectiveness of vocabulary learning compared to traditional learning settings or approaches (Al-Seghayer, 2001; Groot, 2000; Horst, Cobb, & Nicolae, 2005; Hulstijn, 2000; Jones, 2006; Jones & Plass, 2003; Koren, 1999; Loucky, 2003; Nakata, 2008; Okuyama, 2007; Tsoua, Wang, & Li,

2002; Yeh & Wang, 2003; Yoshii & Flaitz, 2002). A few studies have explored the pedagogical applications of smart phone vocabulary learning (e.g., Alemi & Lari, 2012; Cavus & Ibrahim, 2009; Hsu, et al., 2013; Khazaie & Ketabi, 2011; Levy & Kennedy, 2005; Kennedy & Levy, 2008; Lu, 2008; Redd, 2011; Song, 2008; Stockwell, 2007; Stockwell, 2010; Taki & Khazaei, 2011; Thornton & Houser, 2001; Thornton & Houser, 2005; Zhang, et al., 2011). A general overview of the findings of these studies indicates that vocabulary learning via mobile devices and other smart phones is more effective than learning via traditional settings and methods because the distributed or spaced presentation and repetition of lexical items that accompanies mobile-based learning is more effective than the massed repetition that accompanies traditional book-based, self-regulated vocabulary learning (Nation, 2001; Thornton and Houser, 2005; Zhang, et al., 2011).

Additionally, mobile devices equipped with smart technology software and up-to-date multimedia features can open up new vistas of language learning (Reis, Bonacin, & Martins, 2009; Godwin-Jones, 2008; Ryu, & Parsons, 2009; Hede, & Hede, 2002). Thus, smart phones can function as miniature classrooms wherein learners can partake in the "anytime, anywhere" learning movement (Schachter, 2009). Given this fact, mobile technology can be useful in seamlessly inducing a transfer of learning from inside to outside the classroom (Redd, 2011).

The theories and implications related to the use of smart phone applications in language learning are, however, still in their infancy, suggesting that students and teachers are ahead of the new media that are characterized by challenging trial-and-error processes, and teachers and students are involving these smart phone devices and applications in the intricate process of language learning (Chen & Chung, 2008; Conacher, 2009). Furthermore, despite the increasing body of research in both the areas of ESL and EFL, relevant theory and empirical findings have not been taken seriously when designing language learning materials (Bull and Kukulska-Hulme, 2009; Taki & Khazaei, 2011).

Underlying Theories of MALL

MALL is a new trend; however, the theories that underpin MALL can easily be derived from established learning theories. Specifically, there are five main theories of learning that can be utilized to explain MALL; namely, behaviorism, cognitivism, zone of proximal development, social learning theory, and the law of effect.

Some critics have noted that early explanations of the effects of computer-mediated technology on learning were deeply rooted in stimulus-response theory and suggested that future research should consider characteristics of the learner, such as the cognitive aspects of learning, in these technology-based milieus, attitudes, and motivations (Alavi and Leidner, 2001; Chen, Hsieh, & Kinshuk, 2008; Yearta, 2012). For instance, Alavi and Leidner (2001) observed that "the majority of previous studies have mainly relied on the stimulus-response theory, which probed only the relationship between technology [stimulus] and learning [response] (p.99).

Cognitivist theories

According to cognitivist theories of learning, linguistic information is processed verbally and visually (Jones, 2004; Mayer, 1979, 2005; Paivio, 1986). Thus, the multi-store model of cognitive processing theories proposed by Atkinson & Shiffrin (1968) hypothesizes that there are

three types of memory: Sensory, Short-Term (STM), and Long-Term Memory (LTM). This model has been empirically examined by testing the relationship between vocabulary acquisition and verbal short-term memory (Gupta & MacWhinney, 1977; Greffe, Linden, Majerus, & Poncelet, 2005).

The use of multimedia stimuli is appealing because it can provide audio-visual and verbal stimuli in the form of verbal schemata via different modes of stimulus reception. The use of multimodal cognitive tools, in turn, appeals to the variety of learners and learning styles present in any educational setting. Although, according to cognitive theories, people process verbal and visual stimuli in dual channels, each of which processes only a portion of the available information at one time.

Another theory offered by this approach is the cognitive load theory, which implies that learning material should be designed to minimize the cognitive load of the learners during the learning process (Mayer, 2005). Given that working memory capacity is restricted, learners may be showered by a rapid inflow of information that will result in cognitive overload if the complexity of the instructional materials is not properly managed. This cognitive overload can inhibit the schema acquisition process and, consequently, result in poorer performance (Sweller, 1988). The cognitive approach to mobile learning thus assumes pre-orchestrated pedagogical content, which permits highly modular content that can be easily assimilated by students in natural or semi-natural learning settings (Klas & Zaharieva, 2004).

A third theory is the Zone of the Proximal Development proposed by Vygotsky (1978). This theory proposes that learning occurs in three phases. In the first phase, independent learners feel comfortable and can achieve or solve problems on their won by relying on their current knowledge and skill level. The next stage occurs when the learner is able to work on a problem that is just beyond the level at which he can complete it independently, and the problem eventually creates confusion or tedium. This is the stage in which the zone of proximal development occurs (Murray & Arroyo, 2002; Vygotsky, 1978). The third phase is that of frustration; in this phase, the learner is or should be provided a scaffold with which to build up his database and/or skills so that he can solve the problem or perform the assigned task independently. This theory suggests that learners work within a state of instruction and development (Chaiklin, 2003).

The use of mobile devices (smart phones in the present study) enables learners to move beyond their current skill level using the mobile device as a scaffold (Benson, 1995; Ganske, 2000). By being presented with lists of vocabulary via the Whatsapp application on mobile phones, students are introduced to words that are currently beyond their knowledge base but within their grasp. Then, through the interaction with these words provided by strategically placed scaffolds that are represented by the learners' excessive and repetitive access to an online dictionary, increases in vocabulary are attained.

Thus, learning vocabulary words using a mobile device to access online dictionaries provides ample scaffolding or support at the present level of the learner's knowledge base. Next, through these scaffolded experiences, knowledge levels advance beyond their previous levels. Slowly, the scaffolds are phased out, which leaves the learner with the ability to apply the knowledge gained in conditions in which support was provided in scenarios without any support (Chaiklin, 2003; Murray & Arroyo, 2002). Ultimately, it is the learner's responsibility to acquire lexical knowledge and apply that knowledge to word usage independently, which allows the

cycle to begin. The Zone of Proximal Development seeks to engage learners at the optimal instructional level in a safe and supported manner.

Social learning theories

The fourth theoretical model that explores the way mobile device-based learning occurs based on social learning theory. Using mobile phones for learning can, in theory, mesh well with the implications of Bandura's Social Learning Theory, which assumes that peoples' actions are strongly influenced by their consequences (Bandura, 2006). Accordingly, learners conceptualize and anticipate the possible consequences of their behavior. During this process, learning can be induced by four essential factors; i.e., attention, retention, reproduction, and motivation (Child, 1993; Erickson, 1974; Gu, 2003; Kirsch, 2010; Moore, 1999; Yearta, 2012).

Learning vocabulary via mobile phones can also fit well with this theory. First, the amount of attention paid to the task and the steps needed to complete it are essential for success in the learning tasks, and the Whatsapp and Online Dictionary applications must be accessed to acquire the tasks. Revamping the learners' motivations towards the assigned tasks, making the tasks a part of their weekly scheduled assignments and the expected rewards of receiving extra credit can also increase the attention the learners' pay to the models and important components deemed necessary to achieve the reward (Bandura, 2006). Second, the text, graphics, audio and video that can be downloaded to the mobile devices can potentially increase memory of the content experienced. Memory is used to organize and mentally code the items to be attended to and experienced. Third, based on feedback from the teacher via Whatsapp, learners' behaviors are modified, and the correct responses for the task can be reproduced. This feedback can also be considered imitative learning because observing and focusing on the feedback provided helps learners' make decisions that will attempt to maximize the rewards earned (Bandura, 2006). Finally, there are motivational incentives of using applications such as Whatsapp and the Online Dictionary (Yearta, 2012). These incentives can come in the form of intrinsic factors, such as feelings of satisfaction that come from learning something through curiosity, exploration, and manipulation, or extrinsic factors, such as incentives, rewards, punishments, co-operation, and completion (Child, 1993; Yearta, 2012).

Theory of the law of effect

Finally, the fifth theoretical framework that can explain how mobile device-based learning occurs through trial and error is based on Thorndike's theory of the law of effect. The theory is a branch of behaviorism and according it, the learner opts for the path of least resistance to the goal that results in the greatest satisfaction (Thorndike, 1905). Accordingly, behaviors are modified based upon experiences and their consequences (Thorndike, 1913). This position is best exemplified by trial-and-error learning (Simpson & Stansberry, 2008). Mobile devices and their applications can provide repeated opportunities for learners to engage in an activity. In this regard, Erickson (1974) notes that "the learner is rewarded or punished depending upon what he does; the 'effect' (satisfaction or annoyance) contingent upon how the learner responds to the environment (p. 15).

This interaction between the user and the mobile device allows for the learner to experiment with different actions and experience rewards and punishments based upon those decisions. These outcomes can increase the motivation and attention of the learner who is playing a game (Erickson, 1974). Once the learner has discovered the behavioral principle

behind the learning, which can occur through a combination of positive and negative reinforcements, the learner can continue to learn in new contexts (Blachowicz & Fischer, 2008; Erickson, 1974; Skinner, 2006). Receiving word lists and being tasked with looking those words up the Online Dictionary on a mobile device can create new educational possibilities for learning. These five general theories can construct a complete picture of the underpinnings of learning theories as applied to vocabulary learning on a mobile device.

Methodology

This is an experimental study that involves a pre-test, posttest, control group design.

Participants

The 58 participants were chosen randomly. Participants were divided into the experimental group (27 students) and the control group (31 students).

Table 1: *Descriptive statistics of the research groups*

Group	Frequency	Percent
Experimental group	27	46.6
Control group	31	53.4
Total	58	100.0

Figure 1: *Group participation in the study*

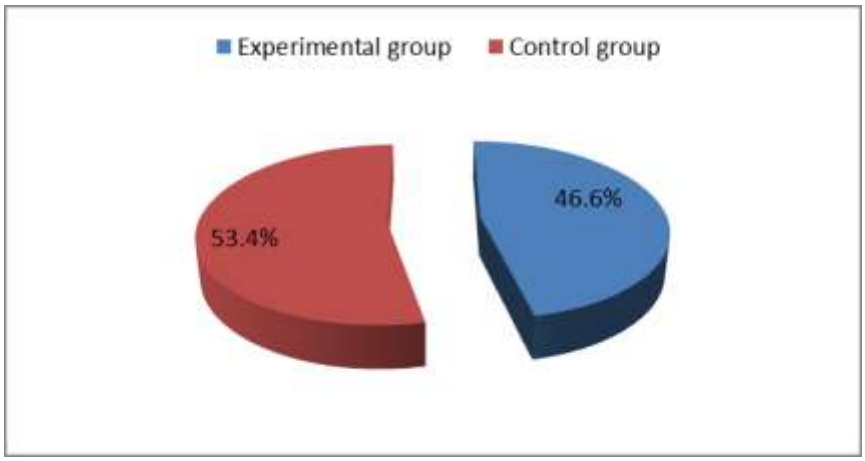
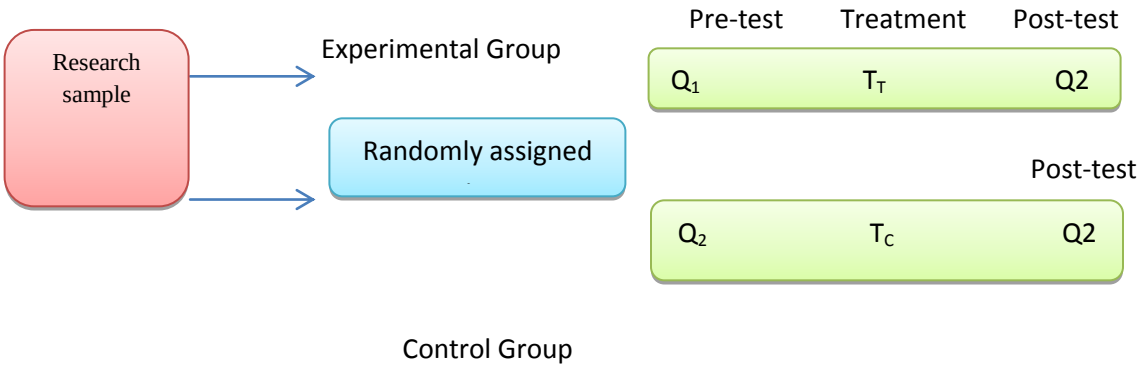


Figure 2: Research design



Where:
Q_1 and Q_2 represent the pre-test and post-test assessments of the dependent variable, XT represents the treatment condition and XC represents the control or standard treatment condition.

As shown above in Figure 2, an experimental group and a control group participated in the study. Participants were randomly assignment to one of the groups. The pre-test was administered to each group at the same time.

Training sessions occurred thrice weekly for the duration of the first term of the 2012/2013 academic year. Next, post-tests were administered to both groups. In the control group, only 31 participants completed the pre- and post-tests. Comparisons of performances on the pre- and post-tests for the 27 experimental group participants and the 31 control participants were performed with SPSS (version 16).

Procedures

The experimental group was sent a list of words selected from the textbook using Whatsapp 3 times a week after each class. Learners in this group were asked to define the words using the Android Online Dictionary (http://dictionary.reference.com/) application, use the words in sentences they created and send those sentences back to their peers and the teachers for correction.

Control group participants were asked to do the regular homework while they studied in the traditional way. Control participants were given the same word lists and were asked to turn in their homework on paper each class.

Each class for each group continued for three hours and met three times per week. The groups were taught by the same instructor to avoid instructor-related effects. Pre-test and post-tests were used to determine the efficacies of vocabulary acquisition for each group and determine the effects of each instructional approach on the motivation of the participants in each group.

Instrumentation

The study involved pre- and post-testing with the Vocabulary Test (See Appendix A). Below are descriptions of the test's reliability and validity.

Test validity

A test is valid when "it measures what it is supposed to measure" (Oller, 1979, p. 70). To ensure that the test employed was valid, the researcher examined the internal, face, construct,

trustees, and content validities of the test. The test items were evaluated by experts in the field to validate the suitability of the test items for measuring the students' lexical knowledge, the students' abilities to use the lexicon, the clarity of the instructions, the feasibility of the test items, the suitability of the allotted time, and the test organization. Changes to the test items were made based on feedback from the experts.

Test reliability

The test-retest method was used to examine external reliability. For this purpose, a pilot study of 37 students was conducted. The Vocabulary Test was piloted to ensure that the test was appropriate for this level. To further investigate the test's internal consistency, Cronbach's alpha was calculated for the data from the pilot study. The alpha value was .937, which is considered high. Thus, the test was found to be statistically reliable.

Statistical methods

The SPSS statistical package was used to analyze the data from the pre- and post-tests. Analyses included calculations of frequencies, percentages, means and the Pearson product moment coefficient, which indicates the strength of the relationship between two sets of numbers. Paired and independent samples t-tests were also used to determine whether differences in means between the two groups were significant at the .05 level.

Findings of the Study

The statistical analyses listed above were used to compare the following: the pre-test means for both groups, the pre- and post-test means for both groups, and the post-test means for both groups.

Tables 2 and 3 present the descriptive statistics of the pre-test data for the control and experimental groups

Table 2: *Group statistics*

	GROUP	N	Mean	Std. Deviation	Std. Error Mean
pretest	Experimental group	27	59.85	4.761	.916
	Control group	31	58.81	4.963	.891

Table 3: *Independent Samples Test*

	Levene's Test	t-test for Equality of Means

		for Equality of Variances							95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
pretest	Equal variances assumed	.203	.654	.815	56	.418	1.045	1.282	-1.523-	3.614
	Equal variances not assumed			.818	55.453	.417	1.045	1.278	-1.516-	3.607

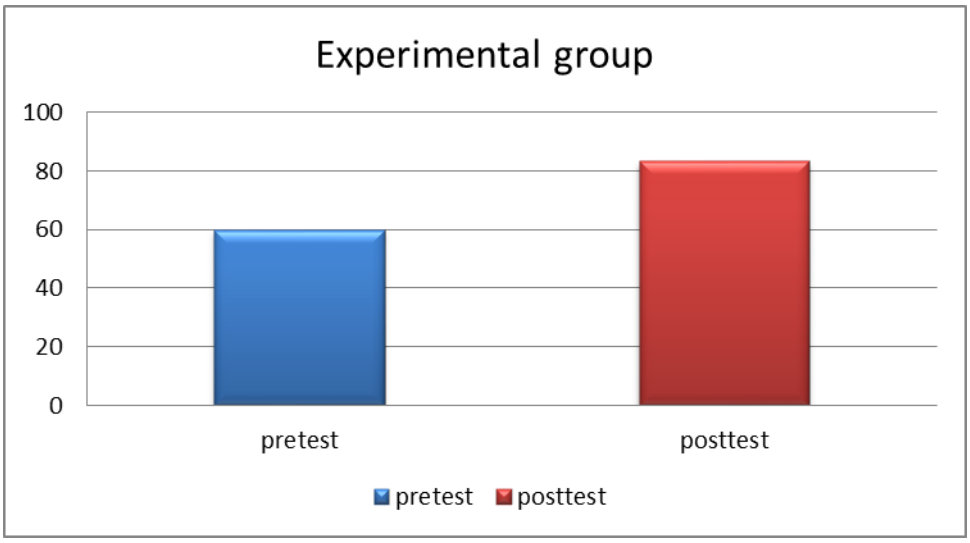
Findings from the t-tests

The tables below show t-test analyses of the groups' participants that demonstrate the equality of the groups on the variables of the study before the experiment was initiated. To determine whether this difference between the pre- and the post-tests was statistically significant, a t-test was applied as shown in Table 4 below:

Table 4: *Comparison of Pre-test and Post-test achievement scores of students in the experimental group*

Paired Samples Test		Mean	N	Std. Deviation	t	Sig. (2-tailed)
Experimental group	pretest	59.85	27	4.761	-17.755	.000
	posttest	83.22	27	4.246		

Figure 3: Performance of the experimental group in the pre- and post-test.



According to the data presented in Table 4, the average pre-test score of the experimental group was 59.85, and the average post-test score 83.22. A dependent t-test revealed that the pre- and post-test scores from the experimental group were significantly different ($t(26) = -17.755$, $p<0.05$ (.000)).

Tables 5 and 6 provide descriptive statistics of the post-test for the control and experimental groups.

Table 5:*Group statistics*

	GROUP	N	Mean	Std. Deviation	Std. Error Mean
Posttest	Experimental group	27	83.22	4.246	.817
	Control group	31	61.06	5.221	.938

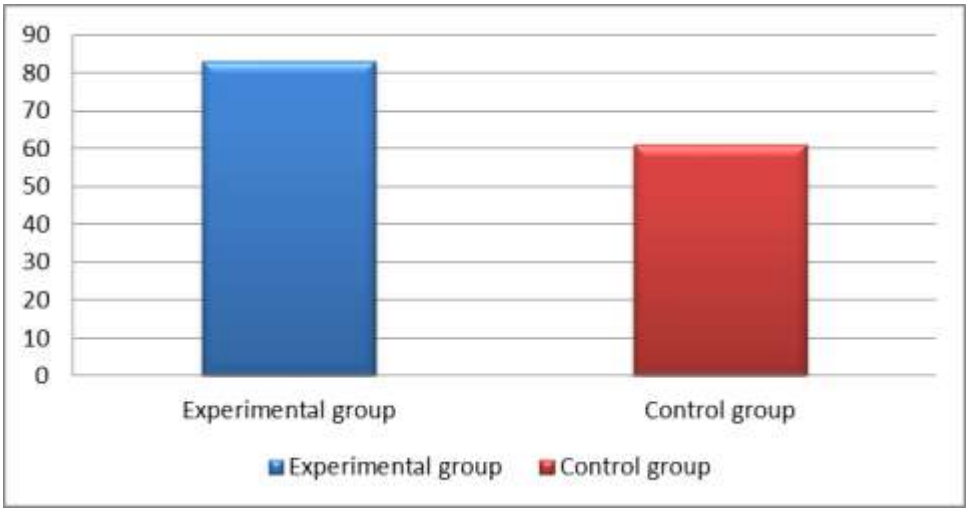
Table 6: *Independent samples test.*

	Levene's Test for Equality of Variances	t-test for Equality of Means

									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
posttest	Equal variances assumed	1.078	.304	17.561	56	.000	22.158	1.262	19.630	24.685
	Equal variances not assumed			17.814	55.760	.000	22.158	1.244	19.666	24.650

The data in Table 5 reveal that average post-test of the experimental group was 83.22, and the average post-test score of the control group was 61.06. An independent samples test revealed that the difference in these scores was statistically significant (t (56) = 17.561, p<0.05 (p = .000).

Figure 4: Post-test scores of the experimental and control groups.



Hence, the main hypothesis of the study, which states that students taught by the mobile application-based experimental method will score higher on the post-test than on the pre-test, was verified. This result indicates that the vocabulary skills of the experimental group improved over the course of the experiment.

A motivation questionnaire designed to recognizing the motivational patterns of the students in the experimental design was used to probe the motivations of the students in the experimental group (see Appendix B). The results of this questionnaire showed a moderate reliability value of 0.941. Before investigating the scores from this questionnaire, inter-rater reliability was demonstrated with by Pearson correlation coefficient.

Table 6: *The Pearson correlation coefficients for inter-rater reliability*

Statements	Correlation	significant
I feel enthralled using smart phones to learn English vocabulary.	.922**	0.000
I feel more motivated to do my vocabulary assignments when there is internet connectivity for my mobile phone or after I get the assignments via Whatsapp.	.800**	0.000
It is great fun learning the new vocabulary list via Whatsapp and the Online Dictionary application on my smart phone.	.715**	0.000
Using the Online Dictionary application on my smart phone makes it easy for me to look up and learn new words, their derivations, their etymology and their usage in illustrative examples.	.912**	0.000
I will continue to use the Online Dictionary application and its dictionary, word dynamo, thesaurus, and translator capabilities to learn and actively use newly learned vocabulary.	.658**	0.000
I have developed an e-lifestyle using Whatsapp and the Online Dictionary and frequently, on a daily basis, look up and learn new words.	.894**	0.000
I prefer to use digital dictionaries and vocabulary lists over paper-based dictionaries and traditional word power activators.	.818**	0.000
I am increasingly engaged in learning vocabulary via mobile devices compared to paper-and-pencil methods.	.840**	0.000
Over time, smart phones have become less of a distraction and more of a tool for learning new vocabulary.	.792**	0.000

Statements	Correlation	significant
I can get more vocabulary assignments done when I am working on my smart phone than when working with paper-and-pencil sheets.	.712**	0.000

The inter-rater reliabilities of the ten statements of this questionnaire were estimated with Pearson correlation coefficients. The 10 items were rated on 5-point Likert scales. The five available responses were the following: (1) Strongly Agree (5 points), (2) Agree (4 points), (3) Neutral (3 points), (4) Disagree (2 points), and Strongly Disagree (1 point). Most of these items were asked from the positive point of view (e.g., I feel enthralled using smart phones to learn English vocabulary), and these questions were scored as 5, 4, 3, 2, or 1 point.

The same questionnaire was given to the students in both groups after the post-test was completed. Fifty-eight copies of the questionnaire were distributed, and the students' responses were cross-validated. No invalid responses were detected; thus, the total number of valid questionnaires collected and analyzed across both groups was 58.

Findings from the Motivation Questionnaire

The researcher first examined intra-group motivational changes. Table 7 illustrates the students' motivations toward learning.

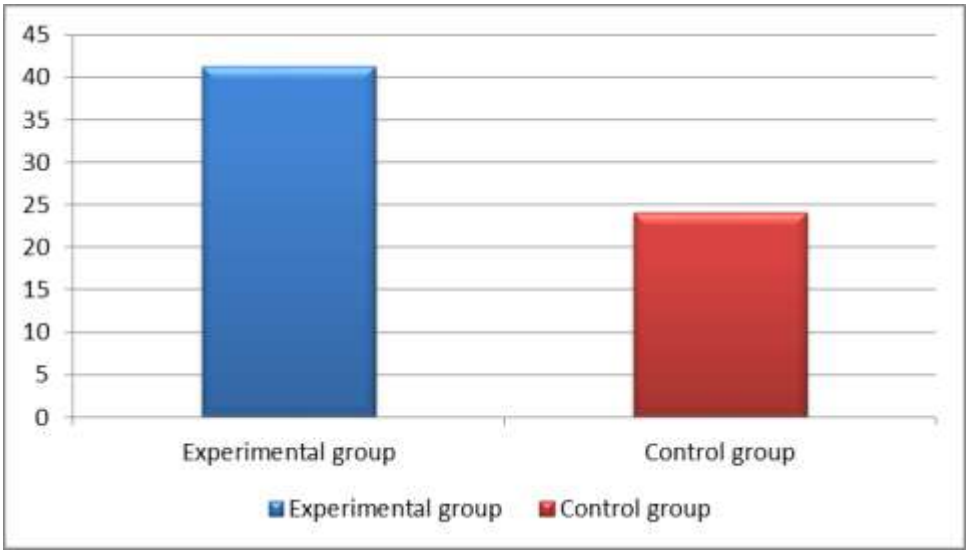
Table 7: *Post-test comparisons of group participants on the motivation scale*

Statements	GROUP	N	M	SD	*t*
I feel enthralled using smart phones to learn English vocabulary.	Ex.	27	4.11	.934	6.926
	Ctrl	31	2.42	.923	
I feel more motivated to do my vocabulary assignments …	Ex.	27	4.04	.898	6.333
	Ctrl	31	2.45	.995	
It is great fun to learn new vocabulary lists sent via Whatsapp and the Online Dictionary application on my smart phone.	Ex.	27	3.56	.577	5.876
	Ctrl	31	2.42	.848	
Using the Online Dictionary application on my smart phone makes it easy for me to look up and learn new words …	Ex.	27	4.81	.396	10.940
	Ctrl	31	2.68	.945	
I will continue to use the Online Dictionary applications	Ex.	27	3.93	.730	8.157
	Ctrl	31	2.26	.815	
I have developed an e-lifestyle using Whatsapp and the Online	Ex.	27	4.30	.669	8.586

Statements	GROUP	N	M	SD	*t*
Dictionary and frequently, on a daily basis, look up and learn new words.	Ctrl	31	2.45	.925	
I prefer to use the digital dictionaries and vocabulary lists over paper-based dictionaries ….	Ex.	27	3.96	.854	7.796
	Ctrl	31	2.16	.898	
I am increasingly engaged in learning vocabulary via mobile devices compared to paper-and-pencil methods.	Ex.	27	4.19	.834	7.627
	Ctrl	31	2.45	.888	
Over time, smart phones have become less of a distraction and more of a tool for learning new vocabulary.	Ex.	27	4.15	.907	7.476
	Ctrl	31	2.35	.915	
I can get more vocabulary assignments done when I am working on my smart phone …..	Ex.	27	4.26	.712	7.563
	Ctrl	31	2.52	.996	

As illustrated in Table 8, the mean scores from the motivation questionnaire were 41.2963 and 24.1613 for the experimental and control groups, respectively, after participation in the MALL intervention for one semester. The difference in the means between groups was statistically significant (p =. 000).

Figure 5: Motivation for vocabulary learning



Analysis & Discussion

The experimental participants' experiences using a mobile device may offer a glimpse of the possibilities of educational mobile applications as tools for formal learning. The instructional protocol included using Whatsapp to send the students' words they could look up using the Online Dictionary application for Android, and this protocol effectively taught vocabulary and maintained participants' motivation for learning new vocabulary.

The formal vocabulary learning via mobile devices, mastery learning through self-regulated word look-ups using another Android application (the Online Dictionary), peer review of word usage in participant-generated sentences, transfer of learning, and engagement in the learning process via MALL were all aspects that contributed factors to the results revealed by our thorough data analysis.

In addition, vocabulary learning involves memorizing the sounds, the written forms, and the meanings of words and the ability to retrieve these three aspects of the words from memory. The quality of this retrieval, from the cognitive perspective, largely depends on the effective use of short- and long-term memory. The ability to freely move between the Whatsapp lists, the Online Dictionary Android application, word applications for mobile devices, and text messaging applications for dissemination of student-created sentences on the same mobile device may have improved attention spans and involvement in the learning process; this speculation finds support from prior research (Alemi & Lari, 2012; Hsu, et al., 2013; Khazaie & Ketabi, 2011; Redd, 2011; Taki & Khazaei, 2011; Zhang, et al., 2011).

Furthermore, the ultimate goal of learners is to retain newly acquired vocabulary, keep the vocabulary in long term memory, and store the vocabulary in layers of schemata that are easily and effectively retrieved when needed. However, newly acquired vocabulary is usually stored in the short-term memory and few words can be transferred to long-term memory without "multiple encounters with a lexical item, cognitive depth, affective depth, personalization, imaging, use of mnemonics and conscious attention that is necessary to remember a lexical item" (Pavičić Takač, 2008, p. 10). Accordingly, Wang and Thomas (1992) revealed that rote learning or memorizing vocabulary using traditional vocabulary lists students study at home is less effective than imagery-based instruction. Therefore, for long-term memory retention and retrieval of vocabulary, constant and effective reinforcement through frequent peer-motivation, robust self-motivation and active associations are necessary to facilitate the process of language learning (Gu, 2003; Kirsch, 2010; Moore, 1999).

The findings of the present study are commensurate with those of prior research (e.g., Alemi & Lari, 2012; Cavus & Ibrahim, 2009; Hsu, et al., 2013; Khazaie & Ketabi, 2011; Levy & Kennedy, 2005; Kennedy & Levy, 2008; Lu, 2008; Redd, 2011; Song, 2008; Stockwell, 2007; Stockwell, 2010; Taki & Khazaei, 2011; Thornton & Houser, 2001; Thornton & Houser, 2005; Zhang, et al., 2011), demonstrating that short-term spaced vocabulary learning via mobile phones can be more effective than massed vocabulary learning through paper-based mediums. This increased efficacy may be due to the students' easy access to the mobile devices, and the easy-to-use Android applications that can facilitate improved vocabulary learning through repeated exposure to and frequent practice with the vocabulary items in a spaced manner on a daily basis; this speculation is also compatible with prior research findings (Abdous, Camarena, & Facer, 2009; Oblinger & Oblinger, 2005; Hsu, et al., 2013; Kukulska-Hulme & Shield, 2008; Kukulska-Hulme, 2009; Shih, 2007; Nah, White & Sussex, 2008; Nation, 2001; Thornton and Houser, 2005; Zhang, et al., 2011).

Overall, the findings of the present study indicate that technology has the ability to increase learning rates compared with traditional methods. Overall, the students felt that mobile devices with Android applications such as Whatsapp, text messaging and the Online Dictionary, were faster, easier, and more motivating. Furthermore, the mobile device applications utilized in the MALL meet the classifications deemed necessary for quality vocabulary instruction by Nagy (1988). Nagy (1988) found that vocabulary instruction should include integration, repetition, and meaningful use. According to Nagy (1988), integration entails tying new learning to familiar concepts; semantic mapping is essential. Repetition, which entails providing students with many encounters with the new vocabulary so that new knowledge can move into their reading vocabulary, was accomplished by sending the word lists thrice a week and the frequent swapping among peers of the student-generated sentences. Thus, the students had ample opportunities to observed their progress, which resulted in ample and efficient contexts for vocabulary learning in the case of the experimental group and echoed what Nagy (1988) recommended in this regard.

Conclusions

Several conclusions that may impact students' vocabulary acquisition, retention, and motivation can be made from the findings of this study. First, the results suggest that mobile device applications harnessed for vocabulary instruction and learning are useful and effective tools. Thus, the researcher conclude that incorporating explicit vocabulary instruction into daily classroom activities is an effective way to increase students' vocabulary learning, retention, retrieval and motivation for learning inside and outside of classrooms. Additionally, the results indicate that collaboration among students, represented in the current study by peer review, is also important for enhancing vocabulary learning. In sum, the present results suggest that integrating smart phone technology and vocabulary instruction increases the motivation and engagement of most students and motivation and engagement are further increased when students possess connected mobile devices.

Furthermore, repetitious work in meaningful contexts is also vital to vocabulary learning (Allen, 1999; Baker, Simmons, and Kameenui, 1995; Nagy, 1988). In addition, Baker, et al. (1995) state the importance of meaningful, frequent use of the words students are attempting to learn. Students should also have the opportunity to frequently engage in word learning (Allen, 1999; Baker, et al., 1995; Nagy, 1988). Word lists generated via Whatsapp and the text messaging of sentences illustrating word usage provide this targeted, frequent, and engaging instruction of vocabulary in the classroom. The findings also suggest that vocabulary building instructors should assign time for daily explicit vocabulary instruction via CMC technologies. The daily vocabulary lessons in this study had three main parts: (1) explicit instruction from the teacher, (2) collaboration among students, and (3) presentation of student work. Every other day, the vocabulary lessons of the mobile device MALL-based intervention began with explicit instruction. This notion is congruent with research recommendations indicating the significance of explicit, or direct, instruction when teaching vocabulary (Beck & McKeown, 2007; Dalton & Grisham, 2011; Rupley & Nichols, 2005; Taylor, et al., 2009).

Furthermore, 'explicit explanation, modeling, and guided practice' (Rupley, Blair, & Nichols, 2009, p. 127) rest at the core of explicit or direct vocabulary instruction, which was mediated in this study via the use of the Online Dictionary Android application to look up words from the instructor's word lists.

Although not the focus of the present study, our results illustrate a byproduct of collaborative learning via the peer review of sentences illustrating word usage; namely, the development of an online learning community via connected mobile devices. Learners should develop an online community to learn with one another (Dalton & Grisham, 2011). Learning is a social process, and social interaction has a central role in the development of cognition (Vygotsky, 1978).

Furthermore, as students found various aspects of MALL appealing and conducive to fun and enthrallment, engagement in the vocabulary activities was vital. This finding is commensurate with the observation made by Mountain (2002) that engagement and motivation make vocabulary learning more fun and, therefore, more powerful. The data from this study suggest that most of the participating students felt more engaged when learning with smart phones connected to the internet.

The use of text messaging applications also proved useful, confirming the results of prior studies that have indicated the usefulness of SMS for pedagogical purposes, especially purposes related to language and vocabulary learning (e.g., Alemi & Lari, 2012; Lu, 2008).

Implications

Below the researcher describes the implications of this study. First, assuming that integrating mobile technology into vocabulary instruction is a viable teaching/learning method for promoting engagement and motivation on the part of students, vocabulary instructors should ensure that students have access to the necessary technological tools and reliable internet connectivity. Second, language instructors at the college level should have quality professional development available to ensure they are able to maximally utilize of mobile phone technologies as was done in this study. Third, our results suggest that the encouragement of additional collaboration among students, teachers and researchers to share knowledge about how and when to utilize technology in the classroom is beneficial for the use and effective, widespread deployment of these technologies. Collaborative language learning and teaching can be fostered with reliable networking systems such as email, blogs, or social networking sites that are available through language management systems that are installed in universities, such as Blackboard.

This study further investigated the implications of embedding technology within the vocabulary building curriculum. To utilize mobile technology for vocabulary teaching and learning, the stakeholders must have access to reliable internet connectivity and be open enriching, enthralling educational opportunities.

Limitations of the study

When relating the findings of this study to the larger research picture, some of this study's limitations need to be acknowledged, and may offer opportunities for further research or replication of the present study. There are several limitations of the present study.

Indeed, the researcher has identified three main limitations: (1) the small size of the sample, (2) the design of the study, and (3) the duration of the study. The small number of participants should be enlarged in prospective replication studies to control for sample size effects. Additionally, this study utilized an experimental approach that inevitably involved uncontrolled environmental variables that may have influenced the findings. For example, the experimental group worked under a fixed schedule of exposure to the new vocabulary words,

whereas the control group did not; this difference may have had as much influence on the outcome as the use of smart phone applications. To clearly establish the influence of mobile phone technology on vocabulary learning, future studies and/or replications should better identify and control for the frequencies and durations of the students' exposure to the target vocabulary. Finally, while effective methods and tools for the gathering, organizing and analyzing of relevant data may influence the effectiveness of learning via of mobile devices, but these tools need to be developed and standardized, and their effects on learning performance should also be controlled for.

Suggestions for Further Research

The limitations of this study may provide useful insights for future research. To expand on the findings of the current study, future researchers could do the following: (1) utilize a more diverse or larger sample size, (2) participate solely as research instructors, (3) study the effects of digital word lists disseminated via mobile technology applications in the Android environment for a longer duration of time, and (4) refine the outcome measures in terms of validity and reliability.

The contributions to the field of the present research could be greatly improved and expanded through longitudinal replication studies. Overall, continued research in the areas of vocabulary acquisition, retention, and motivation is crucial and should be performed across different levels of study, proficiency and varying vocabulary spans of the learners.

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References

Abdous, M., Camarena, M. & Facer, B. (2009). MALL Technology: Use of Academic Podcasting in the Foreign Language Classroom. *ReCALL, 21* (1): 76–95.

Alavi, M. & Leidner, D. (2001). Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues. *MIS Quarterly, 25* (1), 107-136.

Aldosari, H. & Mekheimer, M. (2013). The Bandwagon Effect in the Adoption of E-Learning Systems in Language Learning – an Appraisal. *GSTF Journal on Computing, 2* (4), 61-81

Alemi, M. & Lari, Z. (2012). SMS Vocabulary Learning: A Tool to Promote Reading Comprehension in L_2. *International Journal of Linguistics, 4* (4), 275-287.

Allen, J. (1999). *Words, words, words: Teaching vocabulary in grades 4-12*. York, ME: Stenhouse Publishers.

Al-Seghayer, K. (2001). The effect of multimedia annotation modes on l2 vocabulary acquisition: A comparative study. *Language Learning & Technology, 5*(1), 202-232.

Atkinson, R. C., & Shiffrin, R. M. (1968). Human memory: A proposed system and its control processes. In K.W. Spence & J.T. Spence (Eds.), *The Psychology of Learning and Motivation*, 2, 89-195.

Baker, S.K., Simmons, D.C., & Kameenui, E.J. (1995). *Vocabulary acquisition: Curricular and instructional implications for diverse learners. Technical Report No. 13.* Oregon: National Center to Improve the Tools for Educators.

Bandura, A. (2006). Analysis of modeling processes. In A. Bandura (Ed.), *Psychological modeling: Conflicting theories*, (pp.1-62). New Brunswick, New Jersey: Transaction Publishers.

Beck, I.L., McKeown, M.G., & Kucan, L. (2002). *Bringing words to life: Robust vocabulary instruction.* New York: The Guilford Press.

Blachowicz, C. L. Z., & Fisher, P. (2008). Attentional vocabulary instruction: read-alouds, word play, and other motivating strategies for fostering informal word learning. In A. E. Farstrup & S. J. Samuels (Eds.), *What research has to say about vocabulary instruction* (pp.32-55). Newark, DE: International Reading Association.

Bull, S., & Kukulska–Hulme, A. (2009). Theory- based support for mobile language learning: Noticing and recording. *IJIM, 3*(2), 12-18

Cavus, C., & Ibrahim, D. (2009). m-Learning: An experiment in using SMS to support learning new English language words. *British Journal of Educational Technology, 40*(1), 78-91.

Chaiklin, S. (2003). The zone of proximal development in Vygotsky's analysis of learning and instruction. In A. Kozulin, B. Gindis, V. S. Ageyev, & S. M. Miller (Eds.), *Vygotsky's educational theory in cultural context*. (pp. 39-64). New York: Cambridge University Press.

Chen, Ch. M., & Chung, Ch. J. (2008). Personalized mobile English vocabulary learning system based on item-response theory and learning memory cycle. *Journal of Computer and Education, 51* (2), 624-645.

Chen, N. S., Hsieh, Sh. W., & Kinshuk, W. (2008). The effects of short-term memory and content representation type on mobile language learning. *Journal of Learning and Technology*, 12, 93-113.

Child, D. (1993). *Psychology and the teacher*. 5th ed. New York: Cassell.

Ching, D., Shuler, C., Lewis, A., & Levine, M. H. (2009). Harnessing the potential of mobile technologies for children and learning. In A. Druin (Ed.), *Mobile technology for children: Designing for interaction and learning*, (pp.23-42). Amsterdam: Morgan Kaufmann Publishers.

Conacher, J. (2009). Using technologies in learning, teaching and research: Challenges and opportunities for the language Profession. *Paper presented at the conference of Technology Enhanced Language Teaching and Learning, London, Vernon.*

Cui, G., & Wang, Sh. (2008). Adopting cell phones in EFL teaching and learning. *Journal of Educational Technology Development and Exchange, 1*, 69-80.

Dalton, B., & Grisham, D.L. (2011). eVoc strategies: 10 ways to use technology to build vocabulary. *The Reading Teacher*, 64, 306-317.

Erickson, S. C. (1974). *Motivation for learning: A guide for the teacher of the young adult*. Ann Arbor: The University of Michigan Press.

Godwin-Jones, B. (2008). Emerging technologies: Web-writing 2.0: Enabling, documenting, and assessing writing online. *Language Learning & Technology, 12* (2), 7–13.

Greffe, Ch., Linden, M. V., Majerus, S., & Poncelet, M. (2005). Relations between vocabulary development and verbal short-term memory: The relative importance of short-term memory for serial order and item information. *Journal of Experimental Child Psychology, 93* (2), 95-119.

Groot, P. J. M. (2000). Computer assisted second language vocabulary acquisition. *Language Learning & Technology, 4*(1), 60-81.

Gu, P. (2003). Vocabulary Learning in a Second Language: Person, Task, Context and Strategies. *TESL-EJ, 7* (2). Retrieved online from http://www.tesl-ej.org/wordpress/issues/volume7/ej26/ej26a4/

Gupta, P., & Whinney, B. M. (1997). Vocabulary acquisition and verbal short-term memory: computational and neural bases. *Brain and Language*, 59, 267-333.

Hede, T. & Hede, A. (2002). Multimedia effects on learning: Design implications of an integrated model. *Paper presented at the ASET conference, Melbourne, Australia*.

Horst, M., Cobb, T., & Nicolae, I. (2005). Expanding academic vocabulary with an interactive on-line database. *Language Learning & Technology, 9*(2), 90-110.

Hsu, C., Hwang, G., Chang, Y. & Chang, C. (2013). Effects of Video Caption Modes on English Listening Comprehension and Vocabulary Acquisition Using Handheld Devices. *Educational Technology & Society, 16* (1), 403–414.

Hulstijn, J. H. (2000). The use of computer technology in experimental studies of second language acquisition: a survey of some techniques and some ongoing studies. *Language Learning & Technology, 3*(2), 32-43.

Jones, L. C. (2006). Effects of collaboration and multimedia annotations on vocabulary learning and listening comprehension. *CALICO Journal, 24*(1), 33-58.

Jones, L. C., & Plass, J. L. (2003). Supporting listening comprehension and vocabulary acquisition in French with multimedia annotations. *The Modern Language Journal, 86*(4), 546-561.

Jones, L., (2004). Testing L_2 vocabulary recognition and recall. *Learning and Technology, 8*(3), 122-143.

Kennedy, C., & Levy, M. (2008). L'italiano al telefonino: Using SMS to support beginners' language learning. *The ReCALL Journal, 20*(3), 315-330.

Khazaie, S. & Ketabi, S. (2011). Contribution to Vocabulary Learning via Mobiles. *Journal of English Language Teaching, 4* (1), 174-184.

Kirsh, S. J. (2010). *Media and youth: a developmental perspective*. Malden, MA: Wiley-Blackwell.

Klas, W. & Zaharieva, M. (2004). *Mobilearn: An open approach for structuring content for mobile learning environments*. Berlin: Springer.

Koren, S. (1999). Vocabulary instruction through hypertext: Are there advantages over conventional methods of teaching? *TESL-EJ, 4*(1), A-2, 1-18. Retrieved from http://tesl-ej.org/ej13/a2.html

Kukulska-Hulme A, 2009. Will Mobile Learning Change Language Learning ? *Recall for European Association for Computer Assisted Learning*. 21(2): 157-165.

Kukulska-Hulme, A. and Shield, L. (2007). An overview of mobile assisted language learning: can mobile devices support collaborative practice in speaking and listening? Retrieved from http://vsportal2007.googlepages.com/Kukulska_Hulme_and_Shield_2007.pdf

Levy, M., & Kennedy, C. (2005). Learning Italian via mobile SMS. In A. Kukulska-Hulme & J. Traxler (Eds.), *Mobile learning: A handbook for educators and trainers* (pp. 76-83). Oxon, UK: Routledge.

Loucky, J. P. (2003). Using computerized bilingual dictionaries to help maximize English vocabulary learning at Japanese colleges. *CALICO Journal, 21*(1), 105-129.

Lu, M. (2008). Effectiveness of vocabulary learning via mobile phone. *Journal of Computer Assisted Learning, 24*(6), 515-525.

Mayer, R. E. (Ed.) (2005). *The Cambridge Handbook of multimedia learning*. Cambridge: Cambridge University Press.

Mayer, R. E., 1979. Can advance organizers influence meaningful learning? *Review of Educational Research, 49*(2), 371-383.

Moore, A. (1999). *Albert Bandura*. Retrieved from http://fates.cns.muskingum.edu/~psych/psycweb/history/bandura.htm

Mountain, L. (2002). Flip-a-chip to build vocabulary. *Journal of Adolescent & Adult Literacy*, 46, 62-68.

Murray, T. &, Arroyo, I. (2002). Toward measuring and maintaining the Zone of Proximal Development in adaptive instructional systems. Retrieved from http://centerforknowledgecommunication.info/publications/pubs6/ZPDOperationalITS.pdf

Nagy, W.E. (1988). *Teaching vocabulary to improve reading comprehension*. Urbana, IL: ERIC Clearinghouse on Reading and Communication Skills.

Nah, K. C., White, P., & Sussex, R. (2008). The potential of using a mobile phone to access the Internet for learning EFL listening skills within a Korean context. *ReCALL, 20*(3), 331-347.

Nakata, T. (2008). English vocabulary learning with word lists, word cards and computers: implications from cognitive psychology research for optimal spaced learning. *ReCALL, 20*(1), 3-20.

Nation, I.S.P. (Ed.) (2001). *Learning vocabulary in another language*. Cambridge: Cambridge University Press.

Oblinger, D. and Oblinger, J. (2005). *Educating the Net Generation*. Boulder: Colorado.

Okuyama, Y. (2007). CALL Vocabulary learning in Japanese: Does Romaji help beginners learn more words? *CALICO Journal, 24*(2), 355-379.

Oller, J. W. (1979). *Language tests at school: a pragmatic approach*. London: Longman.

Paivio, A. (1986). *Mental representations: A dual coding approach*. Oxford: Oxford University Press.

Pavičić Takač, V. (2008). *Vocabulary learning strategies and foreign language acquisition. Clevedon*, UK: Multilingual Matters.

Redd, J. (2011). *Supporting vocabulary growth of high school students. An analysis of the potential of a mobile learning device and gaming app*. Unpublished doctoral dissertation, Iowa State University.

Reis, J. C., Bonacin, R. & Martins, M. C. (2009). Mobile Phones Interfaces for Informal Education. In *Online Communities. Lecture Notes in Computer Science (LNCS)*. Springer Berlin, Heidelberg. Vol. 5621, pp. 515-524.

Rupley, W.H., & Nichols, W.D. (2005). Vocabulary instruction for the struggling reader. *Reading & Writing Quarterly, 21* (3), 239-260.

Rupley, W.H., Blair, T.R., & Nichols, W.D. (2009). Effective reading instruction for struggling readers: The role of direct/explicit teaching. *Reading & Writing Quarterly*, 25, 125-138.

Ryu, H. & Parsons, A. (eds.) (2009). *Innovative mobile learning: techniques and technologies*. Hershey, PA: IGI Global.

Schachter, R. (2009, Nov/Dec). Mobile devices in the classroom. *District Administration*, 31-36.

Shih, C.-M. (2007, May). Learning strategies of good Chinese-speaking learners of English. *Paper presented at conference on applied English personnel cultivation, Taoyuan*.

Simpson, E., & Stansberry, S. (2008). Video games and teacher development: Bridging the gap in the classroom. In C. T. Miller (Ed.), *Games: Purpose and potential in education*, (pp.163-184). New York: Springer.

Skinner, B. F. (2006). The science of learning and the art of teaching. In B. A. Marlowe & A. S. Canestrari (Eds.), *Educational psychology in context: Readings for future teachers* (pp.45-55). Thousand Oaks, CA: Sage.

Song, Y. & Fox, R. (2008). Using PDA for undergraduate student incidental vocabulary testing. *ReCALL, 20* (3): 290-314.

Song, Y. (2008). SMS enhanced vocabulary learning for mobile audiences. *International Journal of Mobile Learning and Organisation, 2*(1), 81-98.

Stockwell, G. (2007). Vocabulary on the Move: Investigating an intelligent mobile phone-based vocabulary tutor. *Computer Assisted Language Learning, 20*(4), 365-383.

Stockwell, G. (2010). Using mobile phones for vocabulary activities: Examining the effect of the platform. *Language Learning & Technology, 14*(2), 95-110.

Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science*, 12, 257-285.

Taki, S. & Khazaei, S. (2011). Learning Vocabulary via Mobile Phone: Persian EFL Learners in Focus. *Journal of Language Teaching and Research, 2* (6), 1252-1258.

Taylor, D.B., Mraz, M., Nichols, W.D., Rickelman, R.J., & Wood, K.D. (2009). Using explicit instruction to promote vocabulary learning for struggling readers. *Reading & Writing Quarterly*, 25, 1-16.

Thorndike, E. L. (1905). *The elements of psychology*. New York: A. G. Seiler.

Thorndike, E. L. (1913). *Educational Psychology: The original nature of man*. New York: Teachers College, Columbia University.

Thornton, P., & Houser, C. (2001). Learning on the Move: Vocabulary Study via Email and Mobile Phone SMS. In C. Montgomerie & J. Viteli (Eds.), *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications,* 2001 (pp. 1896-1897). Chesapeake, VA: AACE.

Thornton, P., & Houser, C. (2005). Using mobile phones in English education in Japan. *Journal of Computer Assisted Learning 21*(3), 217-228.

Tsoua, W., Wang, W., & Li, H. (2002). How computers facilitate English foreign language learners acquire English abstract words. *Computers & Education, 39*(4), 415-428.

Vygotsky, L. (1978). *Mind in society: development of higher psychological processes*. Cambridge: Harvard University Press.

White, B., King, I. & Tsang, P (Eds.) *Social Media Tools and Platforms in Learning Environments: Present and Future*. Splinger.

Yearta, L. (2012). *The effect of digital word study on fifth graders' vocabulary acquisition, retention, and motivation: a mixed methods approach*. Unpublished doctoral dissertation. The University of North Carolina at Charlotte.

Yeh, Y., & Wang, C. (2003). Effects of multimedia vocabulary annotations and learning styles on vocabulary learning. *CALICO Journal, 21*(1), 131-144.

Yoshii, M., & Flaitz, J. (2002). Second Language Incidental Vocabulary Retention: The Effect of Text and Picture Annotation Types. *CALICO Journal, 20*(1), 33-58.

Wang, A. Y, & Thomas, M. H. (1992). The effect of imagery-based mnemonics on the long-term retention of Chinese characters. *Language Learning, 42*(3), 359-376.

Zhang, H., Song, W. & Burston, J. (2011). Reexamining the effectiveness of vocabulary learning via mobile phones. *The Turkish Online Journal of Educational Technology, 10* (3), 203-214.

Appendix A

The Online Vocabulary Test

1. For each question, choose which of the four possible answers fits the space best and write **THE CORRECT LETTER** into the empty box. Also think about why the other three answers are not possible.

1. Normally, before you are able to get a job, you have to attend a(n) ☐. If you do well in that, they offer you the position.

a. appointment
b. arrangement
c. interview
d. meeting

2. And when you go, make sure you bring your [ ] to show the manager. This is a sort of record of your education and employment history.
a. RSVP
b. CD
c. CV
d. VCR

3. I am feeling really [ ] today. The weather is terrible and I got some bad news this morning too!
a. lazy
b. punctual
c. miserable
d. starving

4. My uncle [ ] four years ago but he is still very active and says he wished he had stopped work years before!!
a. graduated
b. retired
c. resigned
d. fired

5. I think a teacher should be quite [ ] so that the students who want to learn can, without worrying about other students playing around.
a. serious
b. strict
c. harsh
d. cold

6. If you turn off the central heating if you are away from home for more than a couple of day, you will [ ] a lot of money.
a. earn
b. save
c. win
d. gain

7. We watched the carnival and then stayed behind for two hours afterwards to help the organisers clear away all the [ ].
a. garbage
b. dirt
c. mud
d. pollution

8. I [ ] with you. This movie is really boring! Let's change the channel.
a. accord
b. meet
c. agree
d. join

2. Choose the correct prefix to build new words. **The explanations help you**.

1. _____-board = fair and unconcealed
   ○ up ○ over ◉ on ○ above
2. _____accessible = difficult or impossible to reach or to get
   ○ dis ○ im ○ in ○ un
3. _____affected = not loyal to your situation, organisation, belief etc.

○ dis ○ in ○ un ○ under

4. _____atomic = smaller than (or found in) an atom

○ under ○ sub ○ micro ○ in

5. _____balance = lose your balance and fall

○ under ○ un ○ over ○ im

6. _____beat = positive and enthusiastic

○ down ○ out ○ over ○ up

7. _____byte = a unit of computer memory (equal to about 1 million bytes)

○ mega ○ kilo ○ giga ○ extra

8. _____carious = not safe or certain

○ dis ○ pre ○ un ○ under

9. _____estimate = think or guess that the amount of something is smaller than it really is

○ down ○ out ○ un ○ under

10. _____genic = good-looking (on television)

○ hyper ○ hypo ○ mega ○ tele

11. _____hold = look at or see somebody or something

○ with ○ up ○ over ○ be

12. _____law = to make something no longer legal

○ by ○ out ○ over ○ un

13. _____normal = not normal; not typical or usual or regular or conforming to a norm

○ non ○ in ○ il ○ be ○ ab

14. _____qualify = make unfit or unsuitable, to outcast

○ dis ○ mal ○ re ○ sub ○ un

15. _____sensitive = extremely physically sensitive to particular medicines, lights etc.

○ hyper ○ mega ○ out ○ over

16. _____shore = Away from shore; away from land

○ down ○ in ○ non ○ off ○ up

17. _____shore = on the land rather than at sea

○ up ○ over ○ on ◉ in

18. _____structure = a structure that is built on top of something

○ super ○ sub ○ over ○ mega

19. _____terrain = Being or operating under the surface of the earth

○ a ○ in ○ re ○ sub ○ un

20. _____wind = in the direction in which the wind is blowing

○ up ○ under ○ down ○ cross

3. Choose the person being explained.

1. _____ = the person who leads an orchestra

○ conductor ○ conductist ○ conducter ○ conductee ○ conductant

2. _____ = the contestant who wins the contest, a gambler who wins a bet

○ winor ○ winnor ○ winning ○ winner ○ winer

3. _____ = someone whose occupation is printing

○ printant ○ printee ○ printer ○ printist ○ printor

4. _____ = someone whose occupation is cleaning

○ cleanor ○ cleanner ○ cleanex ○ cleaner ○ cleanee

5. _____ = someone who maintains and audits business accounts

○ accountant ○ accountee ○ accounter ○ accountist ○ accounts

6. _____ = someone who has retired from active working

○ retirant ○ retiree ○ retireer ○ retirer ○ retirist

7. _____ = someone who fights - often for a cause

○ fightant ○ fightee ○ fighter ○ fightist ○ fightor

8. _____ = someone to whom a right or property is legally transferred

○ assignant ○ assigne ○ assignee ○ assigner ○ assignor

9. _____ = someone to whom a licence is granted

○ licensee ○ licenser ○ licensing ○ licensist ○ licensor

10. _____ = one that is absent or not in residence

○ absentant ○ absentee ○ absenter ○ absentist ○ absentor

11. _____ = any member of a ship's crew, a serviceman in the navy

○ sailor ○ sailist ○ sailiant ○ sailer ○ sailant

12. _____ = an agent who conducts an auction

auctionor auctionist auctioneer auctionee auctionant

13. _____ = a theatrical performer

acter acting actor acts actter

14. _____ = a person who participates in competitions

contestant contestee contesteer contester contestist

15. _____ = a person who grows, makes or invents things

creatant createer creater creatist creator

16. _____ = a person who buys, a purchaser

buyeer buyee buyant buyer buyor

17. _____ = a person to whom legal title to property is entrusted to use for another's benefit

traster trustee truster trustist trustor

18. _____ = a high ranking police officer, an investigator who observes carefully

inspecter inspecting inspection inspector inspectour

19. _____ = a follower, distant admirer

devotant devotee devoteer devoter devotor

20. _____ = a criminal who is a member of a gang

gangbang gangs gangsteer gangster gangstor

Appendix B
The MALL Motivation Questionnaire

Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. I feel enthralled using smart phones to learn English vocabulary.					

Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
2. I feel more motivated to do my vocabulary assignments when there is internet connectivity for my mobile phone or after I get the assignments via Whatsapp.					
3. It is great fun to learn new vocabulary lists sent via Whatsapp and the Online Dictionary application on my smart phone.					
4. Using the Online Dictionary application on my smart phone makes it easy for me to look up and learn new words, their derivations, their etymologies and their usages in illustrative examples.					
5. I will continue to use the Online Dictionary application and its dictionary, word dynamo, thesaurus, and translator capabilities to learn and actively use newly learned vocabulary.					
6. I have developed an e-lifestyle using Whatsapp and the Online Dictionary and frequently, on a daily basis, look up and learn new words.					
7. I prefer to use the digital dictionaries and vocabulary lists over paper-based dictionaries and traditional word power activators.					
8. I am increasingly engaged in learning vocabulary via mobile devices compared to paper-and-pencil methods.					
9. Over time, smart phones have become less of a distraction and more of a tool for learning new vocabulary.					
10. I can get more vocabulary assignments done when I am working on my smart phone then when I am working with paper-and-pencil sheets.					