The Use of Dictionary Applications on Smartphones as a Tool to Enhance English Vocabulary Learning Skills

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Abstract: *This study aimed at investigating the effectiveness of some dictionary applications on smartphones and exploring students' opinions toward their use in enhancing English vocabulary learning skills: meaning in Thai, word function, synonym, pronunciation, and meaning in context. A mixed method research design, quantitative followed by qualitative, was employed to elicit information and evidence for the outcomes. The instruments used in the quantitative phase were the pretest and posttest to identify the students' improvement of their vocabulary learning skills. For the qualitative phase, observations together with the researcher's reflections, and semi-structured interview data were collected. Thirty Matthayomsuksa 3 (Grade 9) students volunteered to be participants in this study conducted during the extra-curricular time allotment. After the intervention, it was found that the dictionary applications on smartphones were a helpful tool in facilitating vocabulary learning skills and other language skills, in particular, pronunciation. The learners' autonomous learning also started to prosper as in transferring the skills to learn English used in other subjects or environments. The learners' initial feeling of confusion in handling the dictionary applications turned positive and motivated toward the later part of the intervention. Thus, teachers wanting to implement an online dictionary are encouraged to establish criteria for appropriate applications selection so that learners can maximize the use of the device for educational purposes. The results of this study also point to the need for further research on the use of dictionary applications in enhancing pronunciation competence and fluency. Finally, a wider group of samples with a longer period of intervention may lead to interesting research findings.*

Keywords: Smartphones, dictionary applications, English vocabulary learning, vocabulary learning skills

Introduction

"Without grammar, very little can be conveyed; without vocabulary, nothing can be conveyed" (Wilkins, 1972, as cited in Thornbury, 2008, p. 13). Thus, in order to learn to communicate in English language, the most basic skill to start mastering is vocabulary.

As a result, how to best teach learners of how to learn vocabulary is of interest to all. Wu (2014) underscored the importance of learning English words that many researchers frequently focused on is investigating for ways to effectively help the learners learn new words, so teachers can best guide students in the process of learning English vocabulary.

In recent years, it has been shown that technology is drastically being integrated into our lives. The widespread use of mobile devices, especially smartphones, significantly changes the ways of learning in many contexts including language learning (Kukulska-Hulme, 2009). Numerous mobile applications have also been developed to support different aspects of foreign language learning including listening, speaking, reading, writing, grammar, and vocabulary. Therefore, teachers and learners can integrate mobile devices to facilitate both of teaching and learning methods.

One shortcoming that many Thai students have when learning English, is their limited English vocabulary inventory (Anongchanya and Boonmoh, 2015). Most learners also lack motivation in learning English since they feel that consulting with a traditional printed dictionary is not convenient. They are often required to memorize the meanings of words, but find selecting appropriate words to fill in the given context very difficult. Realizing that many students struggle with this vocabulary learning issue, teachers and educators have tried to find a useful tool in helping learners effectively learn vocabulary and language.

Nowadays, the use of electronic technology such as smartphones for learning has become more common and is widely adopted in various contexts. It is because technology now makes it more convenient to find information on different subject matters. With various special features, the easy and rapid accessibility to the meaning including the correct pronunciation of a word should make dictionary applications much more useful for language learning as well. However, in practice, it appears that most learners cannot use their smartphones for language education effectively since they often get distracted by entertainment and social media services offered in this tool and are not being properly trained of the ways they can benefit from its use. Therefore, it is interesting to adopt the use of dictionary applications on smartphones to enhance English vocabulary learning effectively for educational purposes.

The objectives of this study were aimed at investigating the effectiveness of some applications on smartphones as a tool to enhance English vocabulary learning skills, and to explore students' opinions on the use of dictionary applications on smartphones toward English vocabulary learning. Therefore, the research questions derived from the objectives of this study were first, "To what extent does the use of dictionary applications on smartphones affect English vocabulary learning skills?", and second, "What are the students' opinions on the use of dictionary applications on smartphones in enhancing their English vocabulary learning skills?"

This study is an opportunity to find and adopt an appropriate approach for helping students learn English vocabulary better. The research findings from Anongchanya and Boonmoh (2015) indicated that the use of dictionary applications in smartphones played an important role in helping the participants to complete translating tasks. From this outcome, the idea of using mobile assisted language learning (MALL) can be adopted as the main concept of doing this research as Miangah and Nezarat (2012) stated that mobile devices are increasingly becoming tools for education and language learning, and all its users from teachers to students are getting used to this environment to make education as pervasive as possible. In this study, it could be concluded that the use of dictionary applications on smartphones may have some effects on vocabulary learning skills and students' opinions.

Theoretically, it will become an empirical study in motivating students to learn in the language field by the use of technology, especially smartphones. It will reveal a new approach for enriching students' English language competence. It will also exemplify a model of learning on their own with ease but more systematically. In practice, the findings from this study will be useful for any teachers who are interested in adopting the use of smartphones in developing students' English proficiency or searching for information of other subjects according to their educational purposes. More importantly, it will reveal more educational benefits of the use of appropriate applications on smartphones in other aspects of language learning such as pronunciation, reading, and writing, etc.

Scope of the study

This study was conducted in the context of Matthayomsuksa 3 level. A vocabulary list of 90 words focused in this study was chosen from the words used in *New World Student Book 3*, a textbook listed by the Ministry of Education (MOE) for Matthayomsuksa 3 level curriculum. Moreover, dictionary applications used in this intervention were limited to the general use of dictionary applications that have already been installed in the students' smartphones: they are THAI DICT, CM Thai Dict, and Longdo Dict.

Limitations of the study

A big gap in English language competence among Matthayomsuksa 3 students is a limitation of this study. Their affordance of smartphones with personal internet accessibility is also another limitation for the researcher. More importantly, since this study could not be conducted during regular class time due to the required courses of the school teaching-learning schedule, the researcher had to conduct the research during the extra-curricular classes with only one sample group volunteered for the intervention. Moreover, the range of vocabulary according to the Matthayomsuksa 3 level textbook was also limited by the school curriculum. Therefore, the findings are relevant within the setting and the data taken cannot be generalized outside the study.

Research design

The mixed methods research design was used to provide informative data and evidence for the research outcomes. The quantitative research phase started and was followed by the qualitative research phase. The purpose of employing this research design, which was modified from Creswell and Plano Clark (2011, p. 23), was that quantitative and qualitative data help each other in explaining the research result.

Population, participants, and informants

Thirty out of ninety-nine Matthayomsuksa 3 students at a government secondary school in Chachoengsao province during academic year 2017 volunteered as samples to participate in the intervention based on four criteria, i.e., own a smartphone, be able to afford for an internet accessibility, already had installed a dictionary application on his or her smartphone, and was willing to participate in this intervention program of an extra-curricular activity.

Based on their posttests scores, they were divided into two groups: high achievers and mid-range achievers (there was no low achievers). Three students from each group were randomly selected as informants.

Research instruments

To gather the necessary data both quantitatively and qualitatively, the following instruments were used.

English vocabulary learning skills tests (pretest and posttest)

The pretest and posttest were the same in terms of objectives, vocabulary list of new words not covered in the lesson plans, number of test items (35 items), and weight of the test scores (65 points). The tests were constructed to measure English vocabulary learning in two aspects: First, they aimed to measure students' achievement through the skills that students have already learned (identifying parts of speech and correct meanings) and second, they aimed to measure the skills that students have not learned (identifying synonyms, words with similar pronunciation or rhyme, and correct meanings in context). Then, the tests were sent to three

experts to find the validity by using the Index of Item Objective Congruence or IOC index and piloted with Matthayomsuksa 3 students, who were not engaged in this study in order to explore the reliability.

The tests were also physically divided into two parts to measure. First, they used to measure students' direct transferred knowledge in exploring parts of speech, correct meanings in Thai, and synonyms (15 filling in the blank items, 45 points). Second, they used to measure applied knowledge in areas of selecting words with similar pronunciations or rhyme (10 multiple choice items, 10 points) and correct meanings in context (10 multiple choice items, 10 points). Additionally, smartphones were allowed during the tests and the time for assessment was 30 minutes.

Lesson plans

The content of the lesson plans for ten hours which consists of seven instructional sessions including introductory and wrap-up sessions, was based on the vocabulary lists taken from *New World Student Book 3* and Matthayomsuksa 3 level in MOE curriculum (6 sublists with 15 words each). The focus of each lesson was on the skills used in learning various linguistic features of the words beyond finding the meanings, for example, phonological, morphological, and contextual aspects. In each lesson, other visual aids, games, and worksheets were supplemented for learners to gain more skills. The overall instruction format also followed the Presentation-Practice-Production (PPP) sequence (Lamarca, 2015).

In addition, worksheets were created as exercises for the participants to practice the skills to search for new knowledge both the already acquired skills (finding parts of speech and meanings in Thai) and the newly introduced skills (exploring synonyms, identifying words with similar pronunciation or rhyme, and selecting the appropriate word in context). Then, the lesson plans and worksheets were validated by the three experts in the field of English as a foreign language (EFL).

The content of the worksheet for each vocabulary lesson was physically divided into three main parts and one additional part: 1.) Finding parts of speech and meanings in Thai, 2.) Finding synonyms and sentence examples, 3.) Filling in the blanks with the appropriate word from the list, and 4.) Writing a story by using the words from the list. The three dictionary applications in smartphones most commonly used were allowed (THAI DICT, Longdo Dict, and CM Thai Dict). The characteristics of these dictionary applications were similar in many aspects: they were bilingual dictionaries, provided pronunciation models, gave parts of speech and synonyms, and provided sentence examples. However, two of them could be used only with internet accessibility except CM Thai Dict, which could be used without any internet connection.

Observation notes

The researcher played the role of teacher and observer during the intervention. The class was observed in order to detect student behavior and reaction reflecting their participation, interaction, involvement, and understanding during the instructions.

Journal entries

Journal entries were made by the researcher to reflect on the teaching-learning process and the teacher's reflection throughout all teaching sessions. The journal was divided into two parts, the first part was for the learning process and the second part was for the researcher's own reflection of the intervention.

Semi-structured interviews

The interview questions were carried out in Thai to ensure the interviewees understood and to prevent misunderstandings in order to explore the informants' opinions towards the use of dictionary applications on smartphones. The information derived from the observations and journal helped in setting up more in-depth questions for the interviews. The data of the interviews were also used to triangulate the data from other sources.

The data of qualitative instruments were used to triangulate the data from quantitative sources in order to increase the trustworthiness of the study.

Data collection and data analysis

Data collection

Before the intervention, students did a pretest. Then, they participated in vocabulary instruction. Finally, they did the posttest. The pretest and posttest were the same format and conducted within time limit of 30 minutes in order to explore the progress of students' vocabulary learning skills. In every instructional session, the observation notes were jotted down soon after the class while the journal entries were completed at the end of the day. The researcher also asked for informants' permission to make audio recording before the semi-structured interviews to ensure the correctness of the information expressed by the interviewees. The interviews were held in the office of the English Department after the posttest session during lunch time.

Data analysis

The pretest and posttest scores were analyzed to find the mean, standard deviation, and t-test by a statistical computer package software in order to discover the development of the students' English vocabulary learning skills and compared the scores of the vocabulary pretest and posttest for their progress. Then, the observation notes and journal entries were transcribed, translated, and coded for group student behavior and reaction during the intervention. The data from the interviews were also sequentially processed in the same manner with the observation records and categorized. Finally, all results of this study were put in categories and interpreted for them to be triangulated and support each other in answering what were the students' opinions on the use of dictionary applications on smartphones.

Ethical considerations

A letter seeking permission to conduct the study was sent to the school and the researcher informed in detail the purpose of the study to the students and others involved. The interviewees' prior permission was sought for audio recordings. Moreover, each participant's right to privacy and confidentiality of their personal information was protected to the utmost.

Results and findings

Results of the quantitative research phase

It was noted that the nature of the pretest and posttest is measuring improvement in skills. The table below illustrates the raw scores of the pretest and posttest including the gained scores of each participant.

Table 1 Pretest and posttest scores of the intervention

Code Number	**Pretest Scores** (Out of 65)	**Posttest Scores** (Out of 65)	Gained Scores
1	31	53	+22
2	27	51	+24
3	15	48	+33
4	28	56	+28
5	11	61	+50
6	24	49	+25
7	36	55	+19
8	35	50	+15
9	25	51	+26
10	32	54	+22
11	46	53	+7
12	46	60	+14
13	46	59	+13
14	28	52	+24
15	46	56	+10
16	35	56	+21
17	45	54	+9
18	20	53	+33
19	13	56	+43
20	32	52	+20
21	46	56	+10
22	46	59	+13
23	22	51	+29
24	46	58	+12
25	46	60	+14
26	43	52	+9
27	43	55	+12
28	47	59	+12

Code Number	Pretest Scores (Out of 65)	Posttest Scores (Out of 65)	Gained Scores
29	14	49	+35
30	16	50	+34

It should be noted that all participants' posttest scores were higher than their pretests. Next, Table 2 shows the descriptive statistics for the results of the pretest and posttest, as well as the gained scores.

Table 2 Descriptive statistics of pretest and posttest scores after learning English vocabulary with the use of dictionary applications on smartphones

	N	Minimum	Maximum	Mean	Std. Deviation
Pretest	30	11.00	47.00	33.00	12.17
Posttest	30	48.00	61.00	54.27	3.68
Gained Scores	30	7.00	50.00	21.27	

According to the descriptive statistics, the mean of the posttest scores (M = 54.27, SD = 3.68) of the participants was higher than that of the pretest scores (M = 33.00, SD = 12.17). Moreover, the mean of the gained scores (M = 21.27) shows the progress of the participants' skills. This can be inferred that the use of dictionary applications on smartphones enhance the participants' skills in vocabulary learning.

Table 3 Paired samples statistics of pretest and posttest scores

	Mean	N	Std. Deviation	Std. Error Mean	t	df	p
Pretest	33.00	30	12.17	2.22163			
Posttest	54.27	30	3.68	0.67113			
Posttest - Pretest	21.27	30	10.81	1.97276	10.780	29	.000*

*$p < 0.05$

A paired samples t-test was conducted to compare the mean scores of the participants before and after learning by using dictionary applications. The scores were significantly higher for the posttest (M = 54.27, SD = 3.68) than for the pretest (M = 33.00, SD = 12.17), $t(29)$ = 10.780, p = .000). Thus, the paired samples t-test indicated that there was a significant difference between the pretest and posttest at 0.05.

However, it should be interesting to learn which skills from the five sections of the test items showed more progress. The five skills are two previously learned skills: finding parts of

speech and meanings in Thai; and three newly introduced skills in this intervention: exploring synonyms, selecting word with similar pronunciation or rhyme, and choosing the appropriate word for the context.

Previously learned skills (parts of speech and meanings in Thai)

Most of the students got higher scores in their posttests for these two sections. This could be inferred that the use of dictionary applications on smartphones improved the participants' skills in these areas. It should be noted that some students got the same scores when compared with those of their pretests. However, their pretest scores were already perfect. This implies that the students who volunteered for this study were already good at learning English vocabulary through memorization or other traditional methods. However, the students who might not be good at memorization could also improve their posttest scores after they have gained skills in dictionary applications.

Newly learned skills (synonyms, pronunciation, and meanings in context)

For this section, it should be noted that most participants' posttest scores were higher than their pretests although the progress is not as high as in the previously learned skill sections. Among the three sections, the most improved score is with the exploring synonyms. This is understandable as identifying synonyms is more explicit than what is required in the other two parts: selecting words with similar pronunciation and the appropriate word in context.

Results of the qualitative research phase

This part of the data includes analyses of notes from the researcher's observations accompanied with the reflective journal writing, and responses from the semi-structured interviews.

Answer to research question 1

Since the nature of the tests is an integration of language achievement and successful use of language skills, the response to the first research question, "To what extent does the use of dictionary applications on smartphones affect vocabulary learning skills?", could be grouped into the following areas.

The improvement of translation skills and comprehension

As students are conscious that meanings are the most important area of vocabulary learning and doing well in this area of learning is very much independent of memorization, having a tool to help their accuracy without reciting really relieved them from stress especially among those who not like to memorize. After the interviews, the students agreed that dictionary applications on smartphones explicitly provided meanings for each word, so it facilitated them in translating English to Thai. The students also agreed that after they found the correct meanings of the words they encountered, they better comprehended the lessons and exercises.

The development of pronunciation and listening skills

Since dictionary applications on smartphones provide pronunciation models of native speakers, this helps students to listen, practice pronouncing, and improve their pronunciation skills. It was observed that the students practiced listening and imitating or mimicking the pronunciation sound of the target words many times until they became more familiar. Moreover, they tried to imitate the accent and intonation of the words they heard.

During the interviews, the students also revealed that they had better listening skills and good examples to compare with when they practiced speaking or pronouncing the words. Then, they could better recognize, understand, or identify those words when they heard them in other classes. All seemed to agree that they were more confident in speaking English since knowing the actual pronunciation of words enabled them to pronounce the words clearly and correctly.

This evidence was clear during the presentation stage of the intervention when the students started to be sufficiently confident and volunteered to pronounce the words in front of the class. Some students also stated that they tried to speak English in class instead of Thai.

The fostering of learners' independence

The gathered information pointed to the fact that the use of dictionary applications on smartphones could foster students' learning and increase their applications of language ability in other aspects.

First, dictionary applications on smartphones motivated them to read English on their own, for example, other English books or novels, English subtitles of movies or shows, and billboards or advertisements in English outside school, so they felt that they had better reading skills. They also used dictionary applications to translate unknown words, thus they felt strongly that they better understood and comprehended the content of what they read.

Second, the students started to write more after finishing the required exercises in each worksheet. Since dictionary applications provided sentence examples for each word, this encouraged students to practice writing and making English sentences by themselves. They also started to practice their writing by adapting or changing some words from the sentence examples given in the applications.

Next, the students agreed that dictionary applications on smartphones helped them transfer their skills to other subjects (science and social sciences) and interests (Korean language). They adopted the use of dictionary applications on smartphones for translating new or unknown words in those subjects. They also transferred the use of dictionary applications to understand and comprehend their favorite hobby or interest like Korean drama or entertainment, which have English subtitles.

Moreover, the qualitative data gathered during the intervention demonstrated that the students developed not only their individual linguistic skills, but also life skills of working with others as they were put to work in groups and had to develop and exercise their leadership and willingness to share or suggest the use of dictionary applications to their friends who did not participate in the intervention.

Answer to research question 2

The second research question, "What are the students' opinions on the use of dictionary applications on smartphones in enhancing their vocabulary learning skills?", was answered with the interpretation of the qualitative analysis as follows.

Initial confusion and dissatisfaction

At the beginning, some students seemed to get confused and feel troubled by the process of using dictionary applications in finding parts of speech, synonyms, and sentence examples of the target words since they were previously trained to use a paper dictionary for finding the meanings and parts of speech. Some students preferred to use the paper dictionary because they felt more familiar with it. This might imply that students felt a bit uneasy on the use of online dictionary at the early stages of the instruction.

During the intervention, some students frequently asked the instructor and friends on how to do the exercises, especially in the part of filling in the blanks with the appropriate words for each sentence. The fact that a number of the participants took time to complete their exercises and could not finish all parts of their worksheets was a clear evidence that they were not used to the process and not yet skilled. They even asked to work in groups or pairs instead of alone in order to consult with their friends.

Moreover, a few students were observed to display dissatisfaction with the dictionary applications since they could not find synonyms and sentence examples of some words. They even decided to change from one dictionary application to another or use a paper dictionary instead. However, this only happened for a short time at the beginning.

Satisfaction

As the session progressed, it was observed that the students started to feel more at ease and expressed more positive view towards the online dictionaries. They seemed to better understand how to use the dictionary applications and got familiar with the process. The participants finished all parts of the worksheets on time and got the right answers. They gradually participated in all activities with facial expressions of satisfaction and enthusiasm: smiling, laughing, answering questions by using English words, pronouncing the words along with the video, and helping their friends to finish all exercises from worksheets. When asked what prompted them to express such behavior, the following reasons were mentioned: easy to use, portability, convenience, time saving, free of charge and being easily updated.

Motivation and interest

After each session, it was noticed that the students became more motivated when compared to the earlier one. During the later session of the intervention, the students appeared to have more motivation; they invested greater effort to do all activities and exercises. Their learning curiosity seemed to appear in the areas of linguistics (translation and pronunciation) and language skills (listening, speaking, reading, and writing). They even mentioned that they have adopted the use of dictionary applications in their daily lives and with other subjects or languages. In fact, they actively paid attention to every step of the instructions. Specifically, in the pronunciation part, it was observed that some students started to pronounce the words along with the videos. They also tried to learn on their own and practiced pronouncing the words while listening to the pronunciation models from dictionary applications.

Having more confidence

The students started to develop their autonomous learning along with the use of dictionary applications. During the intervention, most students displayed their confidence while participating in the activities, for example, they volunteered to pronounce the words in front of the class after listening to the pronunciation models from the applications as they had never done this before. The students' confidence was also clearly seen from their leadership when they became the representative of their group to participate in activities and answer the teacher's questions in English. Moreover, some students expressed that they felt more confident to recommend and teach their friends to use dictionary applications and completing their English assignments.

Discussion and conclusions

On the research findings

First, regarding the statistical results from comparing the gained scores of all five sections, the sections that most of the students could greatly improve are the sections on previously learned skills: finding parts of speech and meanings in Thai, which they are having familiar from practice with the traditional approach of using a printed dictionary. The big gain might be because the dictionary application is a tool in helping them find the right answers without memorization. Moreover, knowledge of meaning or translation is the most important area of vocabulary learning for students, thus they paid a lot of attention to this part.

However, some participants made no progress in their posttests in both sections. This is because they had already received high scores or full marks on the pretests. Thus, this might mean that they were already good students at memorization or vocabulary learning, so they could sustain their tests scores at the same level.

Second, the statistical results demonstrated that most of the participants' posttest scores in exploring synonyms, a newly learned skill with the information being explicitly displayed, also increased. This implies that although this skill is newly introduced, the students did not have to do anything else apart from copying the answer down. However, the exception was with some students not making any progress at all because they have already got full marks on the pretest. This implies that many students might already be knowledgeable in synonyms and pay attention in English classes.

Third, it is quite interesting that the scores of identifying a word with similar pronunciation of the target words checking, a newly learned skill, are not congruent with the informants' responses from the interviews. In fact, the students' posttest scores in the pronunciation section did not much increase, but the informants expressed positive view that the dictionary applications were really helpful in pronunciation practice and speaking. A few participants got higher scores while one of them made no progress compared with the pretests. This might happen because they lacked of practice in pronunciation skills including phonetics and listening skills, especially with native speakers. Hence, they could not recognize and understand what they heard from the models. Another reason is that the classroom might not be an appropriate environment for doing this kind of test since there were some noisy interference.

Fourth, the research findings in the part of selecting words filling in context, another newly learned skill, also illustrated an increase in the students' posttest scores. Among all three newly learned skills, this is the least familiar before the intervention. That is why the participants could not finish this section during the pretests and got very low scores or even zero. Later, they could achieved higher scores in the posttests. This happened because the students rarely had the opportunity to practice vocabulary learning in terms of meaning in context.

In relation to other related research

1.) The increase in the test scores

With regards to the statistical results comparing the pretests and posttests, it was found that the participants significantly improved their scores of English vocabulary learning skills in the posttests. This might imply that dictionary applications on smartphones had some effects on students' English vocabulary learning skills. This finding is in congruent with that the previous study by Fageeh (2013) who investigated effects of MALL applications on vocabulary acquisition. His research results demonstrated a significant increase in the posttest scores of the experimental group indicating the benefits of mobile phone applications with regard to their potential for improving vocabulary learning.

However, it should be noted that the students' progress scores in this study might have been increased partially because all participants in this study were students in the Matthayomsuksa 3/1, Science-Math program, who were known to be attentive on their study. Some of them were also already good at English and motivated to learn something new. Thus, their motivation to learn was high.

2.) The improvement of translation skills

The findings of this research revealed that students improved their linguistic skills, specifically in translation skills, one of the most important parts of language learning. Dictionary applications on smartphones could help the students to gain more vocabulary inventory

knowledge and then they were able to understand and comprehend the content. This is similar to previous study of Basal, Yilmaz, Tanriverdi, and Sari (2016) who investigated the effectiveness of mobile application on teaching 40 figurative idioms. The application contained the meaning of the idioms, so the participants performed significantly better in the posttest demonstrating the effectiveness of the mobile application used in this study on learning idioms.

3.) The development of pronunciation skills

The findings revealed that students could improve their pronunciation skills during the intervention with the use of dictionary applications. Then, they could develop their own listening and speaking skills. This research finding is congruent with González (2012) who conducted research on examining some of the most popular iPhone apps designed to learn English pronunciation. It was concluded that iPhone apps have a great potential to practice and improve certain aspects of English pronunciation such as sound discrimination, phonemes, or the pronunciation of individual words.

4.) The fostering of autonomous learning

The findings from the study could indicate that the students developed autonomous learning through the intervention of mobile dictionaries. They used the applications to facilitate their reading skills, so that they had better comprehension and understand English versions of books, novels, or even announcements. The use of dictionary applications also fostered them to practice their own writing by adapting from the sentence examples and then trying to write by themselves. This is in line with the study conducted by Anongchanya and Boonmoh (2015) who investigated the effectiveness of the use of dictionary applications in smartphones in reading an English-language passage and writing a summary in Thai. Their research illustrated that dictionary applications played an important role in helping the participants to complete the tasks.

Moreover, the students transferred the use of dictionary applications on smartphones to other languages and subjects in order to help them find the meaning of specific or new words. This is in agreement with Sedighi and Soyoof (2013) who conducted a research on smartphone applications to uncover the effectiveness in teaching a new language to Iranian EFL learners. The results indicated that mobile applications have a considerable impact upon learning a new language both in terms of language sub-skills (vocabulary, grammar, and pronunciation) and skills (listening, speaking, reading and writing).

5.) Students' opinions towards the use of dictionary applications on smartphones

The majority of the students tended to have more positive attitudes than the negative aspects. Although they perceived the dictionary applications as confusing and an unsatisfactory tool to use at the early stages, they started to express their satisfaction, motivation, interest, and confidence towards the use of mobile dictionaries after the intervention advanced. Similarly, the research findings of Suwantarathip and Orawiwatnakul (2015) revealed that using mobile phones as a learning tool contributed to the success of students and increased their learning motivation.

Furthermore, this research discovered an increase in students' confidence and learner autonomy regarding the development of knowledge and skills of English vocabulary learning. Students' enthusiasm to learn language was also found when they were aware of the importance of English for their education and daily lives. This parallels with the research findings of Rezaei, Mai, and Pesaranghader (2014) which revealed positive change in learners' performance and indicated that using mobile applications helped enhance learning of vocabulary, confidence, class participation, and students had a positive tendency towards the use of multimedia in education.

Recommendations

Based on the conduct of the study, the following recommendations are formulated based on some interesting points found or unfortunately missed in this study.

Recommendations for teachers

Teachers who are interested in training their learners to use dictionary applications on smartphones should be prepared to select the applications based on their advantages and disadvantages before using them in class. This may help the students to use smartphones in school responsibly and educationally in order to have better vocabulary learning and develop other related skills. The teachers are also recommended to prepare the lessons and exercises so that the appropriate skills are used to enhance students' language abilities. Moreover, teachers should encourage the use of monolingual dictionary applications (English to English) for the students in higher levels. Furthermore, the teachers should provide the opportunity for the students to express what they have learned in order to foster their autonomy.

Recommendations for administrators

The administrators are recommended to increase the emphasis on promoting skills along with achievement in order to help students develop their learning in various aspects. With the school administrators' involvement, using smartphones inside the school or even language class should be possible. Moreover, the administrators should be recommended to provide a supportive school facility such as stable internet accessibility for the class activities or even extra-curricular activities.

Recommendations for further research

The use of dictionary applications on smartphones are recommended for further studies in other areas of language learning. The creation of a similarly designed study with focus on pronunciation with regards to phonetics instruction may improve students' speaking skills or enhance students' communicative competences. Other suggestions may include a similar study which employs a longer time frame or longitudinal study of English vocabulary learning skills in order to increase students' vocabulary inventory knowledge. Another interesting avenue of further research would be the comparison of dictionary applications used for translating English sentences. A wider scope of sample or population in different levels may be also examined in order to reach more generalized findings. Finally, a similar study done in a common class with both control and experimental groups to compare the learners' specific skill competencies may be another area of research in this vocabulary learning field.

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