Using Visual Vocabulary App as a Metacognitive Strategy in EFL Learning: A Case of Pre-Service Teachers

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Abstract. This study examined the effectiveness of using the Visual Vocabulary app as a metacognitive strategy for learning English as a Foreign Language (EFL) vocabulary. The participants included 42 EFL pre-service teachers aged 18 - 25 years old, who had an A1+ Common European Framework of References (CEFR) proficiency level and were enrolled in the second semester of an English program at a private university in Loja, Ecuador. These students were divided into experimental (20) and control group (22) by using purposeful sampling. Additionally, two teachers, who were in charge of planning and applying the activities in the classroom, participated in this study. A quasi-experimental approach was used, in which pre and post-tests, questionnaires and teacher's interviews were applied to the participants. In the experimental group, students employed the Visual Vocabulary app as a didactic resource twice a week to increase their lexical knowledge, which allowed them to have control over their own thinking and decisions related to the development of learning activities. As for the control group, they received the same time of instruction but they did not use the app in their classes; instead, they worked on regular classroom activities. The results indicate that the Visual Vocabulary app was effective as a metacognitive strategy to enhance EFL vocabulary learning, and students showed a positive attitude towards the use of this tool. Furthermore, this app was a motivating tool for vocabulary learning, being useful for providing immediate feedback and helping students build their confidence to develop their language skills.

Keywords: EFL learning; language teaching; metacognitive strategies; mobile learning; visual vocabulary.

1. Introduction
Vocabulary is a fundamental aspect of language learning; certainly, words constitute the foundations of a language because they allow us to refer to objects,

actions, and ideas to convey meaning (Ghazal, 2007). In fact, without enough vocabulary, students cannot understand others or express their own ideas (Lessard-Clouston, 2013). Regarding foreign language learning, vocabulary is not an easy endeavor during the learning process, but it is a necessary element in listening, reading, speaking, and writing skills (Nation, 2011). When students learn new words, they can improve comprehension and production in the target language; for this reason, different teaching strategies can be used by EFL teachers to help them develop their lexical knowledge (Al-Jarf, 2007).

In the case of teaching EFL vocabulary, some strategies can be useful to help students acquire lexical skills; in this context, metacognitive strategies allow students to choose the words they need to learn, to find the appropriate way to learn them and to control and evaluate their own learning (Baskin, Iscan, Karagoz & Birol, 2017). All in all, Zhang and Seepho (2012) posit that metacognitive strategies are important for successful second or foreign language learners. In addition, O'Malley, Chamot, Stewner-Mazanares, Russo, & Kupper, 1985; Anderson, 2002; Rasekh & Ranjbary (2003) highlight that metacognitive strategies reinforce students' cognition and enhance their critical thinking; thus, learners can review their own progress and accomplishments in vocabulary acquisition. Metacognitive strategies can also be useful to increase motivation and enhance academic achievement (Moustfa, 2004).

One way to help students apply their metacognitive strategies involves the use of mobile applications because they have been recognized as efficient tools that enable students to learn and practice the language at their own pace (Hwang & Chang, 2011). Furthermore, when teachers use mobile applications in the classroom, they can help students overcome some anxiety problems (Han & Keskin, 2016), improve reading skills (Hsu, Hwang, & Chang, 2013), allow them to practice grammatical structures (Baleghizadeh & Oladrostam, 2010), and enhance vocabulary learning (Hayati, Jalilifar, & Mashhadi, 2013). In this respect, among the multiple mobile apps to learn EFL vocabulary, Visual Vocabulary is one of the most suitable tools for this purpose; indeed, it is a user-friendly application that can work offline and can develop vocabulary skills through interactive activities and specific questions.

This study attempts to determine the effectiveness of the Visual Vocabulary app as a metacognitive strategy for learning EFL vocabulary. This study is relevant because higher education students face many challenges when acquiring lexical skills since they are not aware of their learning strengths and weaknesses. This factor influences their academic performance and their communicative competence in the target language. Thus, in order to address this issue, the following research questions have been posed:

How effective is the use of the Visual Vocabulary App as a metacognitive strategy in EFL vocabulary learning?

What are the students' perceptions about the use of the Visual Vocabulary app in EFL vocabulary learning?

2. Review of Literature

2.1 Teaching and learning EFL vocabulary

Many researchers around the world have acknowledged the importance of vocabulary as an essential language component. Wilkins (1972, p. 111) states that "while without grammar very little can be conveyed, without vocabulary nothing can be conveyed". Nation (2011) emphasizes that learning vocabulary items plays a vital role in speaking, reading, listening, and writing. Certainly, it is not possible to learn a language without lexical knowledge because it is the basis for the communication among human beings (Walters, 2004). Furthermore, vocabulary constitutes a crucial element when learning a second language (ESL) since it is evident that there is a close relation between vocabulary size and language proficiency (Schmitt, 2010). Thus, a vast vocabulary would allow us to use the structures and functions for comprehensible communication (Nation, 2012).

In this regard, teaching vocabulary is important for ESL and EFL teachers. Teaching words is a substantial element of language learning because languages are based on words (Thornbury, 2002). Bearing this in mind, different teaching strategies have been used for learning ESL or EFL vocabulary. In this context, the more effective teaching strategies the teacher uses in the English classroom, the better the learner's language becomes (Putra ,2011).

2.2 Methods and strategies for teaching and learning vocabulary

Strategies for teaching vocabulary are related to what teachers do to help students learn the target language (Hatch & Brown, 2000). There is a variety of strategies that instructors use to teach vocabulary in the EFL classroom, and they are employed to help learners enhance their vocabulary knowledge so that they can communicate in the target language. In this respect, Harmer (2007) asserts that when teaching vocabulary at beginner levels, teachers often use, explain and practice procedures; for instance, they use flashcards, miming, modeling, and cue-response drills before they ask students to use new words in their own sentences. For any levels above beginners, it is assumed that students know a range of different lexical items; therefore, teachers should exploit this information and apply activities that draw on students' existing knowledge.

On the other hand, Takač (2008) affirms that strategies for learning vocabulary refer to activities, behaviors, steps, or techniques that learners use to facilitate the language acquisition process. These strategies help learners to recognize the form and meaning of lexical items, internalize them, and actively use them in language production. Furthermore, Oxford (2016) emphasizes that there are factors that influence the effectiveness of vocabulary learning strategies; these factors include learning styles, age, developmental stage, gender, educational background, and culture.

2.3 Mobile devices in EFL learning

The pedagogical changes brought about by new Information and Communication Technologies (ICTs), and the incorporation of mobile learning in higher education has a big potential in terms of empowering learners to assume an active role in the language acquisition process. In fact, today, mobile devices such as smartphones allow us to access abundant and interactive digital content for academic purposes in almost all fields of knowledge (Jeng, Wu, Huang, Tan, & Yang, 2010).

In the case of EFL teaching and learning, the effective usage of mobile applications is a fundamental part in the learning process (Hsu, 2013). Certainly, students can easily download a variety of apps on their smartphones, through Apple App Store, Google Play, Windows Phone Store, among others (Chung, Chen & Kuob, 2015). These types of mobile applications can be applied for enhancing language skills. In this context, according to Nalliveettil and Alenazi (2016), the availability of free apps or software programs makes smartphones very useful tools for students in the EFL classroom.

As for the use of apps to teach and enhance English skills, there are many tools that students can download for free; for example, some of the most common ones are Duolingo, HelloEnglish, Lingbe, Menrise, Learn English Daily, Hello Talk, etc. (Haider, 2019). However, not all of them are directly aimed at teaching vocabulary. With respect to apps that are aimed at enhancing and developing learners' vocabulary, we can mention Wocabulary, flashcards, Word a Day, Vocabology, Vocabador, and Visual Vocabulary, which can be easily downloaded and installed by students (Educatorstechnology.com, 2019).

In the present study, Visual Vocabulary has been selected from all of the previously mentioned apps because it is an easy-to-use tool that does not require an internet connection. In addition, some characteristics of this app involve answering practical questions, as well as developing and listening skills in an integrated way. Furthermore, Visual Vocabulary is a perfect app from beginner to advanced students because it starts with basic words and phrases, which helps them to learn the target language effectively (Play.google.com, 2019).

2.4 Metacognition and metacognitive strategies in EFL learning

According to Cross and Paris (1988), metacognition is related to learners' knowledge, regulation of their own thinking, and development of learning activities. Metacognition, which is defined as thinking about one's thoughts (Yip, 2017), involves knowledge about cognition and control of cognition, thus including "knowing" and "doing" (Goh & Hu, 2014). Cubukcu (2008) states that metacognition is related to one's own knowledge. Likewise, she declares that "metacognition also includes the active monitoring and consequent regulation and orchestration of information processing activities" (p.1).

Certainly, metacognition is related to awareness of the students' learning needs and the strategies to meet them (Hacker, Dunlosky & Graesser, 2009). As Flavell (1976) states, metacognition allows students to be conscious of their learning strengths and weaknesses so that they can use different strategies to become

more successful learners. Dawson (2008) asserts that learners whose metacognitive skills have been developed can show better abilities for problem-solving, decision making and critical thinking than others. Thus, metacognitive development allows students to succeed in foreign language acquisition (Cubukcu, 2008).

Regarding metacognitive strategies, Baskin, Iscan, Karagoz, and Birol (2017) declare that they are helpful to choose which words should be learned and to find the most appropriate learning approach. They also affirm that metacognitive strategies help students control and assess their learning. Additionally, Anderson (2003) affirms that metacognitive strategies are more influential than other learning strategies since once a student knows how to control his/her own learning, the language acquisition process advances at a faster pace.

The importance of metacognitive strategies has been highlighted in research (e.g. O'Malley, Chamot, Stewner-Mazanares, Russo, & Kupper, 1985; Anderson, 2002; Rasekh & Ranjbary, 2003) since students with metacognitive skills are able to reinforce their cognition and review their own progress and accomplishment, also enhancing their critical reflection and thinking. The advantages of an exhaustive application of metacognitive strategies have been reported by Zhang and Goh (2006). They found that learners, who were conscious of the benefits of this type of strategies, were more successful when applying them in language learning.

2.5 Previous studies

Research regarding metacognitive strategies and their application in learning EFL vocabulary has been conducted in a variety of contexts around the world. Studies such as the one by Rasekh and Ranjbary (2003) have focused on the effect of metacognitive strategy training by using explicit strategy instruction to improve EFL college students' vocabulary. Their study used an experimental design including two groups (experimental and control). The results showed that explicit metacognitive strategy training has a notable influence on EFL students' vocabulary learning.

Trujillo, Álvarez, Zamudio, and Morales (2015) also studied the influence of metacognitive strategies on the development of high school students' lexical competence in EFL. To implement these strategies, they used students' learning journals, teachers' field notes, questionnaires and mind maps. The results indicated the development of metacognitive awareness of the student's vocabulary learning process, which contributed to having an increase in students' range of vocabulary. In addition, students were more active in the learning process and could identify their strengths, weakness, and feelings, which allowed them to overcome their difficulties and be more productive in the English lessons.

A similar study was conducted on school students by Diaz (2015), who analyzed the impact of metacognitive strategies on lexical competence in EFL learners who faced problems when developing and retaining vocabulary. A qualitative

method in which participants were exposed to metacognitive strategy instruction was utilized. This instruction consisted of five interventions based on the cognitive academic language learning approach. The findings showed that metacognitive strategies (to improve vocabulary through learning journals) proved to be beneficial for vocabulary acquisition skills.

Likewise, students seemed to favor metacognition in vocabulary EFL learning as demonstrated by Entesari and Zohrabi (2016). The purpose of their study was to analyze the use of metacognitive strategies for vocabulary learning in the Iranian context. To achieve this aim, 120 EFL learners were randomly selected after administering a test named "Nelson English Language Test". Then, the Schmitt's Vocabulary Learning Strategies (VLS) test was applied to the participants. All in all, this research demonstrated the positive effect of metacognitive strategies on lexical knowledge in the EFL classroom and the students' preference for those strategies. Thus, the results evidenced that cognitive strategies were selected by intermediate learners and metacognitive strategies were favored by students who had an advanced level.

Studies have also been found in terms of using mobile applications to improve vocabulary learning in ESL/EFL environments. The results indicate that the use of mobile apps to teach English vocabulary is helpful in different contexts. For example, Agca and Özdemir (2013) studied the impact of the multimedia content integrated into learning materials using 2D barcode technology for vocabulary learning and learners' perceptions about this innovative learning environment. The participants were 40 students who were randomly assigned to 2 groups. An achievement test, a pre-test, and a post-test were administered to measure students' vocabulary knowledge before and after employing a printed course book, online learning material and Microsoft Tag technology to learn EFL vocabulary. This mobile learning environment helped college students improve their lexical knowledge for the target terminology.

Rezaei, Mai, and Pesaranghader (2014) used free mobile applications (Busuu and Interactive English) with intermediate-level EFL learners to examine their effect on English vocabulary learning. The results were promising in favor of using these apps for vocabulary acquisition. This was reflected in the improvements in the scores of the students' post-tests, which translates into the enhancement of the students' knowledge of vocabulary.

In the case of high-school students, Guaqueta and Castro-Garces (2018) used the learning apps Duolingo and Kahoot as didactic tools for vocabulary building in a rural EFL context in Colombia. A mixed-methods approach was used to gather, analyze and validate information. Twenty high-school students participated in a six-month period intervention which involved the use of both apps outside the classroom. The instruments used were a diagnostic and a final test. The results indicate that these learning apps helped Colombian high-school students foster EFL vocabulary building, so the results were positive since students gained confidence and assurance of their improvement in learning and had a good attitude with respect to the use of mobile applications for practicing the target words.

Other studies involve the design of mobile applications to learn English vocabulary. In the case of ESL environments, Wu (2014) developed an application software program called Word Learning that contained 1274 English words. In order to verify the benefits of this program, two groups of students, test group and control group, were established. The results of this study show that the Word Learning app is more productive when college students attempt to learn English vocabulary on their smartphones.

3. Method

3.1 Participants

The participants of this study were 42 EFL pre-service teachers aged 18 - 25 years old that were enrolled in the second semester of the English program at Universidad Técnica Particular de Loja. We used purposeful sampling to select the students, who were divided into two groups: experimental group (20) and control group (22). The English proficiency level of the participants was A1+, according to the CEFR scales. Additionally, two teachers were in charge of planning and applying the activities in the classroom with and without using the Visual Vocabulary app.

3.2 Instruments
The following instruments used were previously piloted and validated before their application:

- A basic vocabulary pre-test was administered to both experimental and control groups in order to measure their previous lexical knowledge. This instrument consisted of 16 multiple-choice questions.
- A diagnostic questionnaire that included 10 multiple-choice and open-ended questions was applied to know learners' previous experience using mobile apps as a metacognitive strategy for learning EFL vocabulary.
- A teacher's interview was conducted to identify perceptions on the students' performance while using the Visual Vocabulary app.
- A post-test, with similar characteristics to the pre-test, was used at the end of the academic term.
- A post-questionnaire that consisted of 10 multiple-choice and open-ended questions was administered to identify students' perceptions regarding their experience while using the Visual Vocabulary app as a metacognitive strategy to reinforce EFL vocabulary.

3.3 Procedure

The present study used a quasi-experimental approach in which two classes were chosen to be the experimental and control groups respectively. In this design, the participants are purposefully selected so that an idea, practice or procedure is tested to determine if it affects the findings (Creswell, 2015). The data for this research were gathered during a five-month period, which corresponds to the second semester of the English program at Universidad

Técnica Particular de Loja. There were a total of 42 EFL pre-service teachers enrolled in two EFL classes. These two classes were administered a pre-test and a diagnostic questionnaire at the beginning of the academic semester.

In the experimental group, students used the Visual Vocabulary app twice a week as a metacognitive strategy to practice vocabulary and increase their lexical knowledge. Students followed the established planning of 14 lessons that included tests, listening exercises, writing words, spelling and pronunciation activities. In addition, the teacher administered vocabulary tests on a weekly basis so that students could demonstrate that the app was effective as a metacognitive strategy in EFL vocabulary learning. The results of these tests allowed the instructor to provide effective feedback regarding students' needs; for instance, the teacher suggested the appropriate contexts in which the words could be used. Concerning the control group, they covered the same contents of the established planning, but they did more traditional assignments without using the Visual Vocabulary app.

At the end of the intervention, students from both groups were given a post-test aimed at measuring their progress in vocabulary acquisition using the 2-tailed t-test, working with the following parameters: mean, standard deviation and p-value. In addition, the students in the experimental group completed a perceptions post-questionnaire and their teacher was interviewed in order to express her impressions on the effect of using the Visual Vocabulary app on learners' metacognitive skills.

The results of the pre and post-tests were tabulated and statistically analyzed using SPSS, allowing the researchers to compare and contrast students' vocabulary learning in both groups. Additionally, the findings in the students' and teachers' perceptions were interpreted.

4. Results

The results of the diagnostic questionnaire evidenced that 61.11% of participants believed that these devices are indeed engaging elements in the learning process. With respect to students' previous experience on the use of mobile apps for learning English vocabulary, 83.33% affirmed that they had used them for this purpose. However, their knowledge of using apps as metacognitive strategies to learn EFL vocabulary was low (44.44%). Also, 94.44% of learners expressed their willingness to use apps for learning EFL vocabulary in their training as future English teachers. In fact, the most important aspects they considered when selecting an app for that purpose were the easy use (72.22%), interaction (66.67%), and accessibility (55.56%).

The results of the pre-test show that the experimental group obtained an average score of 11.35 out of 20 points, while the control group, 11.69. After applying the students' t-test, we found out that there was not a statistically significant difference in the scores between the two groups.

With respect to the post-test, we can observe that the mean in the experimental group was higher than the mean in the control group. This difference is statistically significant (p=0.0195<0.05) and favors the experimental group in terms of the effectiveness of using the Visual Vocabulary app as a metacognitive strategy (see table 1.)

Table 1. Post-test results

Control group	Experimental group
Mean: 13.81	Mean: 15.66
SD: 2.476	SD: 2.107
t: 2.45 p=0.0195	

It was also found out that the results of the post-questionnaire evidence that most of the students (85.72%) felt motivated when using mobile devices in the EFL classroom. In this case, the Visual Vocabulary app as a metacognitive strategy was perceived by 64.29% of students as an easy-to-use tool.

Students expressed a positive attitude towards different aspects concerning the use of this tool for learning vocabulary (see table 2). In fact, the students agreed or strongly agreed in most of these aspects that are related to learning new words in English: learning vocabulary in context through visual support, improving students' oral and written production, as well as increasing students' motivation and metacognition (interest, awareness for learning vocabulary, and autonomy).

Table 2. Experimental group's perceptions on the use of Visual Vocabulary app as a metacognitive strategy

Uses of the Visual Vocabulary App as a metacognitive strategy	Strongly agree	Agree	Neither	Disagree	Strongly disagree
The use of Visual Vocabulary allowed you to learn new words in English by yourself.	50%	50%	0%	0%	0%
The Visual Vocabulary tool allowed you to autonomously learn words in context.	35.71%	50%	14.29%	0%	0%
Visual Vocabulary is a tool that allows you to improve oral and written production in the English language.	50%	50%	0%	0%	0%

Visual Vocabulary helped you improve your pronunciation in the English language.	35.71%	64.29%	0%	0%	0%
The Visual Vocabulary tool allowed you to self-regulate your vocabulary learning.	69.23%	23.08%	7.69%	0%	0%
The Visual Vocabulary tool improved your ability to remember new words through visual support and take advantage of your learning strengths.	50%	50%	0%	0%	0%
Your interest in learning English was increased through the use of the Visual Vocabulary tool.	50%	42.86%	7.14%	0%	0%
The use of Visual Vocabulary motivated your participation in the activities planned by the teacher.	28.57%	57.14%	14.29%	0%	0%
The use of Visual Vocabulary allowed you to manage your learning and improve your autonomy.	21.43%	50%	28.57%	0%	0%
The Visual Vocabulary tool allowed you easy access through mobile devices.	42.86%	57.14%	0%	0%	0%

5. Discussion

First of all, the previous experience and willingness that the participants had for using mobile apps for learning EFL vocabulary was an important support that allowed us to conduct this study with the Visual Vocabulary app as a metacognitive strategy. After the intervention using this app, in which students in the experimental group had the opportunity to check their own progress (a feature of metacognition), it could be observed that a statistically significant difference indicated the effectiveness of this tool as a metacognitive strategy to learn vocabulary. These results are in line with research that demonstrates the effectiveness of metacognitive strategies for learning EFL vocabulary (e.g. Trujillo, Álvarez, Zamudio & Morales, 2015; Diaz, 2015; Entesari & Zohrabi, 2016), and the importance of mobile applications to learn it (e.g. Rezaei, Mai & Pesaranghader, 2014; Guaqueta & Castro-Garces, 2018; Wu, 2015).

The use of the Visual Vocabulary app, as a metacognitive strategy was perceived by students as a motivating factor that promoted autonomous vocabulary learning in the EFL classroom. In addition, it was perceived as an easy-to-use tool that can help students self-regulate their learning and build their vocabulary skills, including aspects such as listening, speaking, writing, and spelling (Turdugulova, 2018). In fact, mobile apps are beneficial because they can offer timely feedback and thus ensure constant motivation for those learners who are not encouraged by traditional educational settings (Valk, Rashid & Elder, 2010). All in all, the participants showed positive perceptions regarding the of this mobile app for learning EFL vocabulary, which might be caused by the increasing students' interest in technology, the easy and free access to this app, the possibility of choosing when and where to learn by themselves, and the user-friendly features that Visual Vocabulary app has. In this concern, Al-Emran, Elsherif, and Shaalan (2016) declare that mobile apps offer learning opportunities at anytime and anywhere settings. They also enable team collaboration and thus contribute to knowledge sharing. Furthermore, Nisbet and Austin (2013) claim that mobile apps for vocabulary learning allow learners to establish their own study routines, set their own pace for practice, and focus on their needs and goals.

6. Conclusions and implications

The use of the Visual Vocabulary app proved to be effective as a metacognitive strategy to enhance autonomous EFL vocabulary learning; students could make their own decisions regarding time, place and other aspects related to their vocabulary learning activities. In addition, the app was a motivating tool for vocabulary learning since it provided immediate feedback and helped students feel more confident when learning listening, speaking, writing and spelling in the target language at their own pace. In general, technology is appealing for EFL learners; thus, the participants showed a positive attitude when using the Visual Vocabulary app as a metacognitive strategy, which helped them to enhance their vocabulary knowledge and perform better in the target language.

Finally, in the Ecuadorian context, not all the students have access to smartphones, which hinders learners' practice and active participation in the activities planned by the teacher. Furthermore, access to educational institutions in Ecuador is difficult because of some government restraints. Thus, the sample of this study was taken from only one institution, and the results may not be generalized to other contexts. Future research should consider using a larger sample and checking the availability of mobile technology for EFL students.

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