Modern English Education, Vol. 16, No. 4, Winter 2015
http://dx.doi.org/10.18095/meeso.2015.16.4.03

Utilizing QR Codes for Vocabulary Quiz in the TOEIC Classroom*

Yoo-Jean Lee
Dankook University

Lee, Yoo-Jean. (2015). Utilizing QR codes for vocabulary quiz in the TOEIC classroom. *Modern English Education, 16*(4), 45-63.

The present study examined the effect of using Quick Response (QR) code, which makes it easier to access a website or resources immediately, with the smartphone as a means of assessing students' vocabulary knowledge. Ninety-six Korean EFL university students who were taking a core intermediate level TOEIC course participated in this study. During the semester, 51 took the QR code-delivered vocabulary quiz, while the other 45 were being given the paper-delivered one. The two groups' vocabulary quiz scores were compared, and the QR code-based groups' responses to the survey were analyzed. The survey results indicated that the students were in favor of using the QR code as it helped them become more motivated, practice more to learn new words and to use them appropriately within sentences, and consequently improve their vocabulary and writing ability. And these positive perceptions of using the QR code for a limited time seemed to have led them to better perform on the vocabulary quiz than those in the paper-based group. It is suggested that the QR code should be used for only a brief time under strict control of teachers in order to maximize language learning.

**[QR code/smartphone/vocabulary quiz/TOEIC/
QR코드/스마트폰/어휘퀴즈/토익]**

I. INTRODUCTION

With huge growth in take-up of smartphones over the past several years, the number of smartphone users worldwide has topped 2.6 billion in 2015 ("6.1B Smartphone Users Globally By 2020, Overtaking Basic Fixed Phone Subscriptions," 2015). In Korea, smartphone user population is growing exponentially by the minute, and more than 40

* The present research was conducted by the research fund of Dankook University in 2015.

million people are now using smartphones ("Number of Smartphone Users in Korea Approaches 40 Million," 2014). As a smartphone makes it possible for people to access audio/video and text/data files, and do various activities with an Intent connection, it has been used productively for learning (S. Cho, 2009). In addition, it is not too much to say that almost all Korean university students own a smartphone and are engaged in various types of learning anywhere at any time by using it (M. H. Ko & Goranson, 2014a). Indeed, it is widely used for language learning, and the effectiveness of its use particularly in vocabulary learning has been examined and confirmed through numerous research studies (S. Chang & H. Kim, 2011; E. J. Choi & D. B. Jeong, 2010; H. Chu, 2011; E. Jang, E. Won, & D. Jeong, 2011; M. H. Ko & Goranson, 2014a, 2014b). In these studies, students were encouraged to install a vocabulary application (H. Chu, 2011; M. H. Ko & Goranson, 2014a, 2014b), given new words/expressions through text messages (Levy & Kennedy, 2005; Lu, 2008; Thornton & Houser, 2005), or provided with vocabulary activities (Stockwell, 2007. 2008, 2010). Survey results and/or vocabulary test results revealed that using a smartphone had positive effect on students' motivation and/or vocabulary improvement. In comparison, in some studies, a smartphone was used as an active language learning tool to scan a Quick Response (QR) code and write a short response (Fujimura & Doi, 2006; Rivers, 2009; Susono & Shimomura, 2006). Since the QR code helps people to access a webpage or information directly without typing a long web address or relying on e-mail or text message, it has been implemented in an educational context (Y. J. Jeon & M. K. Kang, 2013; Rivers, 2009; Susono & Shimomura, 2006). Although students' positive perceptions or effective teaching models of using the QR code for language learning were shown in a couple of studies, their improvement in language ability has not been examined. Moreover, the QR code has been often used to get students' feedback and check their degree of comprehension/agreement in the classroom (Fujimura & Doi, 2006; Sususo & Shimomura, 2006), but it has rarely been used to get their answers to a certain type of language test. Therefore, in this study, the researcher will attempt to find how utilizing the QR code through the smartphone for the vocabulary test would affect Korean EFL university students in terms of their perceptions and their improvement in vocabulary.

II. LITERATURE REVIEW

1. Origin and Features of the QR Code

Quick Response (QR) code was developed in Japan in 1994 by a Toyota subsidiary, Danso Wave, in order to trace their vehicles and automobile parts quickly and efficiently.

One of the key features of the QR code is that it is flexible in size of information, indicating that it can hold a great amount of information (i.e. maximum 7,089 characters of information). The QR code can be also created and read very easily. By using a QR code generator (e.g. http://www.qr-code-generator.com, http://www.qrstuff.com), anyone can link a QR code to a website or webpage. In addition, by using a smartphone with a QR code reader program or app (e.g. http://www.i-nigma.com/Downloadi-nigmaReader.html), one can scan the QR code and access a website immediately without typing its address. Almost all QR code generators and readers are free. Today, QR codes are showing up in books, magazines, newspapers, receipts, bills, commercials, business cards, etc., and are commonly used for marketing by many companies and manufacturers (Rivers, 2009; Robertson & Green, 2012; Susono & Shimomura, 2006).

2. Use of the QR Code for Language Learning in Educational Contexts

Although the QR code has been used for the automobile industry and for other commercial purposes, it is not long ago since it was utilized for language learning and teaching in the classroom (Rivers, 2009; Robertson & Green, 2012).

Fujimura and Doi (2006) used the QR code through the mobile phone to gather college students' degree of understanding of the course content in the class. The students were asked to identify how well they understood the content by selecting one among the five choices: '*very good*,' '*good*,' '*normal*,' '*bad*,' and '*very bad*.' However, it was unknown what course the students were taking and what kind of content they were learning. Moreover, the students' perceptions of using the QR code were not investigated through a survey or interview. Nevertheless, it was found that getting the students' feedback right after the class lecture through the QR code helped teachers improve their future lectures.

Similar to what Fujimura and Doi (2006) investigated in their study, Susono and Shimomura (2006) used QR codes to collect Japanese college students' comments and suggestions concerning the class. Even though QR codes were not used specifically for language learning, 43% of the students responded that using QR codes through mobile phones was helpful for improving their class because not only the teacher but all students could read and share the comments they wrote. Some of the students, however, expressed negative feelings because it cost some money to buy a QR code scanner and access the Internet with their mobile phones. As this study was conducted before the invention of smartphones, the students might have felt the burden of the charge. However, if this study had been conducted more recently where smartphones are prevalent among the majority of college students and where no extra charge is made for downloading a QR code scanner or using the Internet in a Wi-Fi zone on campus, much more students might have showed positive attitudes toward using the QR code in the classroom.

Later, in Rivers' (2009) study, the QR code was used as a way to activate students' English learning. He recruited 132 Japanese college students and implemented three types of QR code-driven activities for teaching speaking, reading, and writing. For example, in a 'paired opinion paragraphing activity,' two students as a team randomly selected one of the QR codes among the two: One was for speaking-based, and the other was for reading-based QR code. The former included instructions to talk about a given topic with anyone in the school and then write about their feelings. In contrast, the latter included instructions to find a reading material located in the school, read it, and then write about their opinions. Another example activity was called a 'problem-solving activity.' About five to six students as a group went around the campus, found several QR codes hidden somewhere in different locations, obtained seven keywords, and finally rearranged those keywords to create a correct message. A survey questionnaire which consists of seven 'Yes/No' questions was given to the students to get their opinions on the use of mobile phones and QR codes as part of their English learning. Most of the students (92%) reported that they enjoyed the QR code-based English class. However, about 32% to 48% of the students were quite skeptical about the usefulness of mobile phones and QR codes. Some pointed out that technical problems (e.g. some mobile phones' inability to scan the QR codes created by different kinds of web-based generators, running out of mobile phone battery in the middle of the activities, etc.) would hinder their learning. Others had conservative views about using mobile phones in the classroom. Since this study was carried out in 2008 where smartphones were not widespread, the students might have thought using a mobile phone in the class was inappropriate despite the fact that the teachers allowed and encouraged them to use it. Also, many of them might not have carried a fully charged mobile phone because they mainly used it for calling someone or sending a text message but rarely used it for getting information from the Internet or learning a language. In addition, they used different types of QR code generators, some of which were unreliable. Using these QR code generators or using an old mobile phone often might have made the students unable to scan the QR codes. Rivers (2009) collected the students' opinions through the survey questionnaire, but each QR code-based activity was provided to different classes on a trial base. Using the QR code-driven activities as part of the curriculum throughout the semester might have changed the students' perceptions more positively. Moreover, examining the students' improvement in speaking, reading, or writing through tests might have made this study more reliable.

The most recent study concerning the use of the QR code was undertaken by Y. J. Jeon and M. K. Kang (2013). They described the advantages of using the QR codes with the smartphone for teaching and learning English and introduced several activities which had already been applied or could be applied in the actual classroom. One of the activities which may help students' practice of English writing was proposed. The teacher asks a

question or provides a writing topic. Students write down their sentences and send them to the teacher (or their friends) through the QR code. Another suggested activity was a task-based language learning activity. At the beginning of the class, the teacher provides a QR code, and then students write about the class objectives. During the class, the students are given their friends' pictures through a QR code, describe those pictures briefly, and then share their sentences or give feedback with one another. At the end of the class, they evaluate themselves or their friends and finally upload their work on the web. Although three types of QR code-driven activities which could stimulate students' interaction and interest were presented in the study, they were not actually implemented in the classroom. Besides, neither the students' perceptions nor their achievement in English was examined.

Up to the present, studies on the use of QR codes for language learning are scarce. Even in those couple of studies, QR codes were employed only one time during the semester, or several ideal QR code-based activities were simply suggested. In addition, no surveys and tests which could observe both students' perceptions and improvement were administered at the same time. Besides, none of the studies had a control group. Thus, it is unknown if using the QR code with the smartphone throughout the semester as a supportive tool for learning English and testing learners' English language skills would be effective or not. Nevertheless, the previous research studies imply that using the QR code with the smartphone may help EFL learners become more motivated and participate in the class more actively. Therefore, in the present study, by using the QR code as a tool of getting Korean EFL university students' immediate responses to the TOEIC vocabulary quiz through the semester, the researcher will attempt to find answers to the following two questions:

1) How do the students think about using the QR code as a tool of taking the TOEIC vocabulary quiz in the classroom?
2) Does the use of the QR code affect the students to develop their TOEIC vocabulary ability? Do the students in the QR code and non-QR code groups show any difference in their performance on the vocabulary quiz?

III. METHOD

1. Participants

Ninety six Korean EFL students (43 males and 53 females) who were taking a mandatory intermediate level TOEIC course at one of the universities in Gyeonggi-do participated in this study. Most of them were freshmen (88), and a few were sophomores (8). Their majors varied including Business, Economics, History, Law, Korean/English

Language and Literature, and Engineering. They had taken a lower level TOEIC course in the previous semester, and it was their second semester to take another TOEIC course. Since the school required all freshmen to complete two TOEIC courses in two consecutive semesters, the majority of the participants were freshmen. However, there were a couple of sophomores who had failed the course a year ago, and thus they were re-taking it.

All students were taught by the same instructor, but were divided into four class sections of 22 to 28 each. By considering the results of the pre-TOEIC test which was administered in the second week of the semester, two class sections of the students (51) were purposely classified as 'experimental group' (i.e. QR code-based group), and the other two (45) as 'control group' (i.e. Paper-based group). The two groups' pre-TOEIC test scores were 613.73 and 610.67 (out of 990), respectively, and were statistically not significant at all (t = .162, p = .871). This indicates that the students in the two groups' TOEIC proficiency levels were similar, and not different.

2. Data Collection

1) Vocabulary Quiz

The vocabulary quiz was administered 10 times in total from the fourth to 14th week of the semester except the eighth week due to the midterm exam. All of the 96 students took the quiz every week, but 51 in the experimental group used the QR code through the smartphone while 45 in the control group used a piece of paper to write down their answers. For each vocabulary quiz, five new words were provided. They were selected from one of the units of the TOEIC textbook (Each unit contained 50 new words.) which was developed by Pagoda publisher. The students were asked to create their own sentences by applying the given words appropriately (Approximately 40 seconds were given for each word.). They could refer to some sample sentences in the textbook or dictionaries when studying vocabulary by themselves at home, but they were not allowed to take a look at any support materials (e.g. personal notes, the textbook, and dictionaries) while taking the vocabulary quiz. Similarities and differences between the experimental and control groups in the processes of preparing and administering the vocabulary quiz are indicated in Table 1.

TABLE 1

Processes of the Vocabulary Quiz

Processes	Experimental (QR Code-based) Group	Control (Paper-based) Group
Before the Vocab. Quiz	1. The instructor explained about how to use QR codes, helped them download and install one of the reliable QR code readers, '***i-nigma***,' (http://www.i-nigma.com/downloadi-nigmareader.html) to their smartphones, and then checked if it worked well.	1. The students were told to prepare a piece of paper so that they could write down their answers to the vocabulary quiz on it.
Before the Vocab. Quiz	2. For each quiz, the same five words for all class sections were selected by the instructor. These five words were given to the group of students who were in charge of the vocabulary quiz. They prepared their own presentation file which includes some important explanations about the words (e.g. definitions, synonyms and antonyms, idiomatic expressions, sample sentences, etc.).	
During the Quiz	1. As soon as the class began, the instructor presented the QR code which had been created through '***Naver***' QR code generator (http://qr.naver.com/) (**See the example on the right**.). 	1. Right after the class began, the students were asked to take out a piece of paper.
	2. For each word, about 40 seconds were given to create a sentence. The students scanned the given QR code, access the Google form (**See the example on the right**.), and then wrote down their names, ID numbers, and answers. 	2. They wrote down their answers. For each word, about 40 seconds were given for them to create a sentence.
After the Quiz	1. The students submitted their answers by clicking '*send*' button. Only about two to two and half minutes (in total) were given. The answers sent after that time were not taken into account for the evaluation (Goggle form showed **exactly what time that each student had sent their answers**, and thus it was easy to find out the students who had sent the answers late.).	1. The students passed their answers to the instructor.
After the Quiz	2. The group of the students who was in charge of the vocabulary quiz came to the front, explained about the meanings of the words, and introduced synonyms/antonyms, sample sentences, and good ways of remembering those words better.	

The students' performance on the 10 vocabulary quizzes were evaluated by the researcher of this study. Each quiz consisted of five questions, and a student was given '*2 (excellent),*' '*1 (quite good),*' or '*0 (very poor)*' point for each question. The mean score for all five questions was then calculated. The highest score that one could get on each quiz

was '*2*,' and the lowest score was '*0*.'

2) Survey Questionnaire

In the last week of the semester, the students in the experimental group were asked to complete a survey questionnaire which involved seven questions (See Appendix 1.). It was done anonymously, but the students were allowed to identify themselves if they wanted. They were given the QR code which would take them to the survey form, and responded to the questions through their smartphones. The questions asked about how many hours per day they were using the smartphone, how much they were using it for English learning, if they had an experience of using the QR code, if using the QR code for the vocabulary quiz was helpful or not, if they would have a preference between the QR code-based and paper-based vocabulary quizzes, etc.

3. Data Analysis

For the first research question, the 51 QR code-based group students' responses to the survey questionnaire were reviewed by the researcher of this study. The students' answers to six multiple choice questions were presented as Venn diagrams, and some of their answers to one open-ended question were provided in their own words (Their comments were translated from Korean to English by the researcher and then checked by a native speaker of English.).

Regarding the second research question, the two groups of the students' performance on the four quizzes which were administered in '*Week 4* (i.e. the first quiz),' '*Week 7*,' '*Week 11*,' and '*Week 14* (i.e. the last quiz)' was assessed. The researcher thought that comparing the students' scores every three to four weeks (rather than every week) would be more effective in measuring their progress in vocabulary knowledge since expecting to observe statistically significant changes in terms of their scores every week seemed to be difficult. Means and standard deviations of the four quiz scores were first estimated. Then the scores that the students in the two groups obtained on the very first and very last quizzes were compared through *t*-tests by using SPSS in order to find out if any differences would be found between the two groups.

IV. RESULTS AND DISCUSSION

1. The Students' Patterns and Perceptions of Using the QR Code

1) The Students' Use of the Smartphone and QR Code

Through the QR code-based group students' responses to the survey questionnaire, it was investigated how they spent their time using the smartphone and QR code. The results are presented in Figure 1.

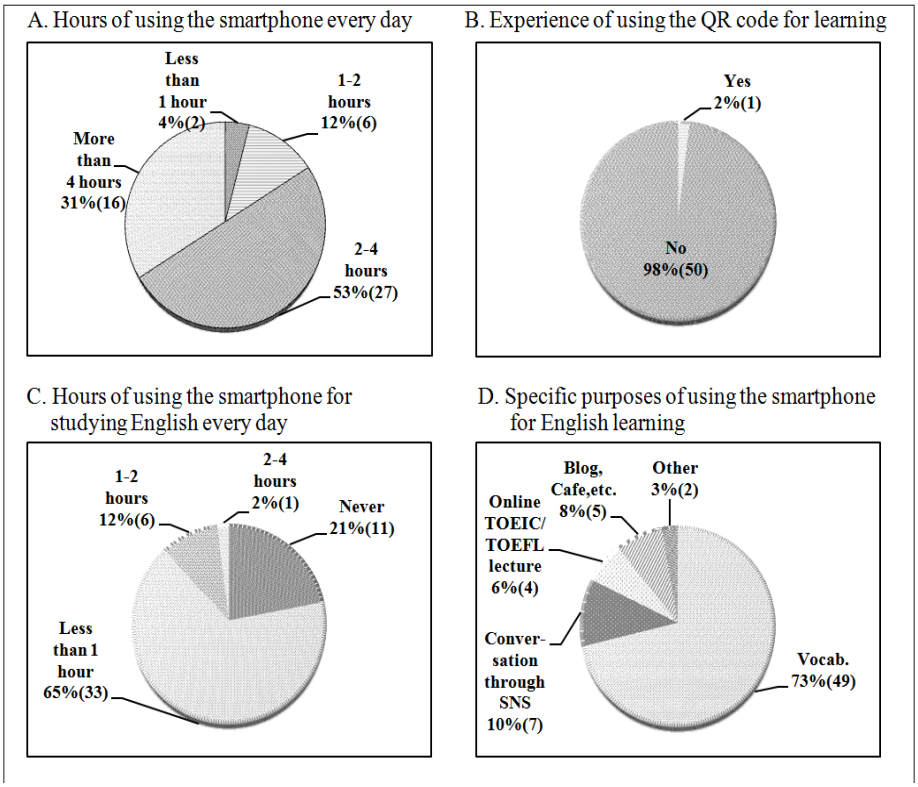

FIGURE 1 A Summary of the Students' Responses to the Questions

Among 51, more than half of the students (27) reported that they were using the smartphone between two and four hours every day, and 31% of them (16) responded that they were using it even more than four hours. There was no one who did not use the smartphone. This implies that the students' lives were inextricably bound up with the use of smartphones. However, in regard to the QR code, all except one student replied that they

were not very familiar with it and did not have much opportunity to use it for the purpose of language learning.

Meanwhile, when the students were asked how long they were using the smartphone every day particularly for studying English, 65% reported that they were using it no more than one hour, but 21%, surprisingly, mentioned that they had no experience of using it at all. In much of the previous research (H. Chu, 2011; M. H. Ko & Goranson, 2014a; Stockwell, 2010; Thornton & Houser, 2005), it was discovered that although university students thought phone-based English learning was convenient because they could do it with no bounds on time and place, many of them pointed out that SNS pop-ups, clicking wrong buttons, small screen, and noisy environment distracted their learning. The students in the present study also might have been willing to use their smartphones for a brief moment, for example, to check new vocabulary meaning or grammatical correctness, but they might have not wanted to look into the small screen for a long time to learn something new. They did not use the smartphone to study English every day, but they had an experience of using it at least once in a while. It was found that they were getting a lot of help from the smartphone when finding the meanings and sample sentences of unfamiliar words. Rather than studying new vocabulary regularly through a vocabulary application or educational website, 93% of the students (49) reported that they were frequently using an online dictionary whenever they had to check the meanings of new words. Ten students responded that they often had conversations with their foreign friends in English through Facebook, Twitter, Kakao Talk, Kakao Story, etc. Another five students mentioned that they sometimes visited a blog or café which provides useful information about the TOEIC, TOEFL, and IELTS tests. A few others (4) said they had a chance of watching online TOEIC or TOEFL lectures.

Through the survey results, it was found that most of the students loved to use the smartphone every day for personal purposes, but not much for English learning. It was also identified that they rarely had experience with the QR code. However, why they had to use it for learning English, they seemed to be in favor of using it only for a short period of time.

2) The Students' Perceptions of the QR Code-based Vocabulary Quiz

Throughout the semester, all 51 students took 10 vocabulary quizzes with the QR code, and how they felt about using the QR code for the vocabulary quiz was asked. Their responses to one of the survey questions were indicated in Figure 2.

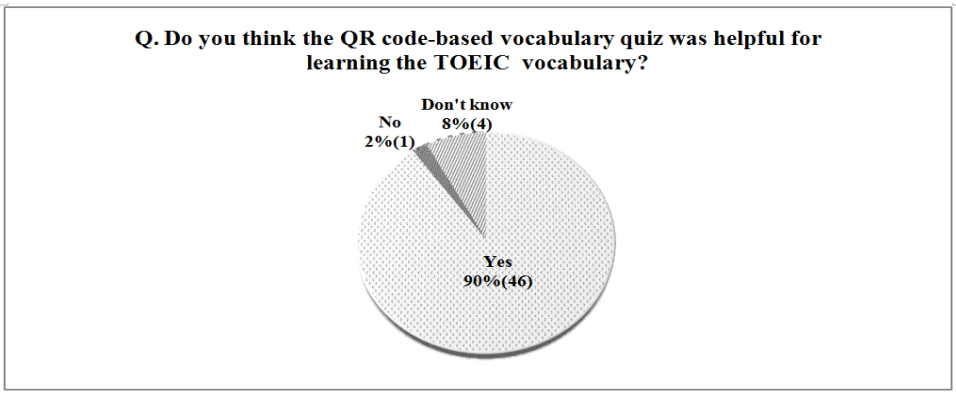

FIGURE 2 The Students' Perceptions about the QR Code-driven Vocabulary Quiz

Except 10 % of the students (5), all (46) were very positive about the QR code-based vocabulary quiz. More detailed comments of the students (See Table 2.) explain what made them thought that taking the vocabulary quiz through the QR code was helpful or not.

TABLE 2

The Students' Comments on the QR Code-driven Vocabulary Quiz

	Comments
Positive	Student A: "*Using the QR code **saved much time because I didn't have to type the long address of the Goggle form**. Latecomers couldn't access the form and write down their answers there. Also, the professor did not have to call the roll. I think it was **very effective for reducing the students' lateness**.*"
	Student B: "*It was very useful because **the time was limited**, and thus only those who studied new vocabulary really hard could write down their answers.*"
	Student C: "*I liked it very much because **I didn't have to use a piece of paper**.*"
	Student D: "*Making my own sentences helped me think more deeply about how to use words appropriately within sentences. **Since I was given only about 40 seconds to write a sentence, I had to study really hard**. I thus could **improve not only vocabulary but also writing ability**.* Also, ***the TOEIC questions became much easier**.*"
	Student E: "*Although I had studied all of the words and thought I was perfectly ready for the test, I failed to write down good sentences at the beginning of the semester. **The problem was that I had never thought about a time limit (on the test)** when I was studying at home. **I thus put much effort to produce well-written sentences in the limited time**, and could develop*

		my vocabulary and writing skills."
	Student F:	"***The QR code was always given right after the class. This made me feel much tension and responsibility**. Also, **cheating was impossible due to the limited time of the test**. I got a lot of stress actually, but I studied very hard in order not to fail the class. I think this helped me remember various words for a long time, and consequently **increase my TOEIC score**."*
Negative	Student G:	"*I always didn't have enough time because **I was very slow when typing something in English**. I usually talk with my friends through Kakao Talk by typing words and sentences in Korean, but not in English…*"
	Student H:	"***Because I was not used to writing in English by touching little buttons on my smartphone, I made a lot of spelling mistakes**. I wanted to revise them, but I couldn't due to the time limit.*"
	Student I:	"***When my battery was low or when the Internet connection was not good, I was worried a lot**. This often disturbed me to concentrate on the test.*"

What the majority of the students thought as the best thing of using the QR code for the vocabulary quiz was that there had been a strict time constraint. '*Student A*' and '*Student F*' mentioned that those who came late could not take the quiz because they were given only about 20 seconds to scan the QR code at the beginning of the class. They thought that this helped them not to be late for the class, and feel more tension and responsibility. They also said that using the QR code-based vocabulary quiz kept them from cheating. Additionally, '*Student B*,' '*Student D*,' and '*Student E*' highlighted the fact that the limited time of writing and submitting the answers was very helpful in that it made them practice creating better sentences in a much shorter time. They thought that this led them to improve their vocabulary and writing ability as well as their TOEIC scores. Interestingly, many students including '*Student C*' pointed out that they felt happy about reducing paper waste.

Unlike the students' positive opinions as described above, a few (3) pointed out several negative aspects of the QR code-driven vocabulary quiz. '*Student G*' and '*Student H*' expressed the difficulties of typing in English and using small buttons. Since they did not have much experience of typing in English, it took much time for them to write down the answers. Also, due to the small button size, they often clicked wrong ones. Another student ('*Student I*') explained about his embarrassing moment because of low battery and bad Internet connection. However, he was the only one who mentioned about these problems. Because the school Wi-Fi was very fast in every classroom, and many students were carrying their smartphone chargers with them, they might not have encountered these

problems.

Overall, the use of the QR code-driven vocabulary quiz elicited positive responses from the students. The greatest advantage of using the QR code was that imposing time constraints was possible. This influenced on the students positively to arrive in the class on time, get a sense of responsibility, be prepared themselves more to create grammatically correct sentences promptly, and eventually to enhance both their vocabulary and writing skills. It is clear that using the QR code for a short period of time during the class had a positive effect on the students in helping them maintain appropriate amount of tension and concentrate on composing more elaborated sentences. Using the QR code for a long time, however, would be inappropriate and ineffective for the students due to the technology problems, small-sized buttons, and difficulties of typing in English. For the final question of the survey, the students were asked what type of vocabulary quiz they would prefer between the QR code and paper-based quizzes. Their responses are presented in Figure 3.

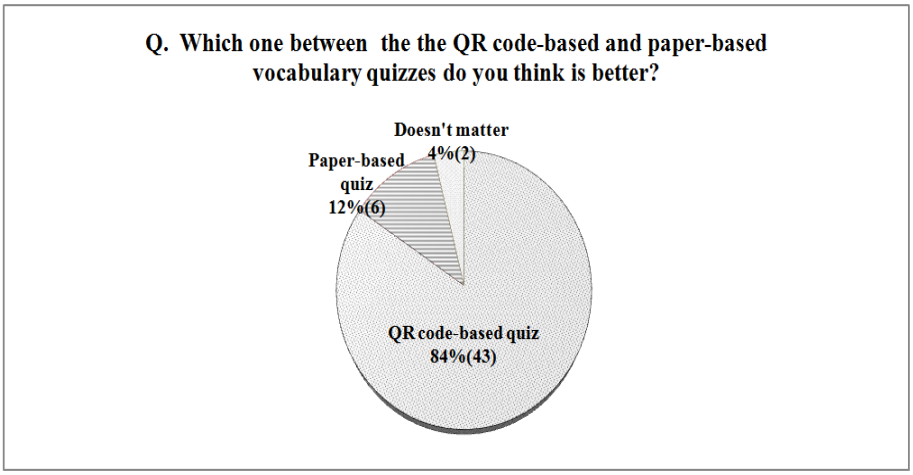

FIGURE 3 Type of Vocabulary Quiz that the Students Prefer

Except eight students, all responded that taking the vocabulary quiz with the QR code was much better than taking it with a piece of paper. This indicates that the overall students preferred the QR code-based vocabulary quiz and thought that it would help them more with improving their vocabulary and wiring ability.

2. Comparisons of the Improvement in Vocabulary between the QR code-based and Paper-based Groups

Although it was confirmed that the students expressed their positive views on the QR

code-driven vocabulary quiz, the next questions were to see if their good perceptions would affect them positively to improve their TOEIC vocabulary and to examine if they would show more or less improvement compared to those who had never used the QR code for the vocabulary quiz. The scores that the students in the QR code-based and paper-based groups obtained on the four quizzes (i.e. '*Quiz 1*,' '*Quiz 4*,' '*Quiz 7*,' and '*Quiz 10*'), respectively, were presented in Table 3.

TABLE 3

Performance of the QR Code-based and Paper-based Groups on the Vocabulary Quiz

Group	N	Quiz 1		Quiz4		Quiz 7		Quiz 10	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
QR code-based	51	.58	.290	.79	.259	1.42	.246	1.78	.140
Paper-based	45	.56	.268	.79	.271	1.11	.251	1.47	.234

On '*Quiz 1*' and '*Quiz 4*,' the two groups of the students did not seem to show much difference in terms of their scores. They even obtained the same score, .79 (out of 2), on '*Quiz 4*.' However, on '*Quiz 7*' and '*Quiz 10*,' the QR code-based group students gained .31-point higher scores, respectively, than the ones in the paper-based group. Starting from the middle of the semester, using the QR code with time constraints might have played a more positive role by helping the students become more motivated and practice more to write better sentences with new words. This eventually might have influenced on them to perform better on the vocabulary quiz.

Whether the students took the QR code-delivered or paper-delivered vocabulary quiz, all of their TOEIC vocabulary had improved to a statistically significant extent from the first to the final quizzes as shown in Table 4 (t = -28.105, p < .01 for the QR code-based group; t = -16.857, p < .01 for the paper-based group).

TABLE 4

Paired T-test Analysis of the First and Last Vocabulary Quiz Scores

Group	Quiz	Paired Differences					*t*	*df*	*Sig.*
		M	*SD*	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
QR code-based	Quiz 1-Quiz 10	-1.20	.31	.043	-1.29	-1.12	-28.105	50	.000**
Paper-based	Quiz 1-Quiz 10	-.91	.36	.054	-1.02	-.80	-16.857	44	.000**

*p < .05, **p < .01

However, when comparing the scores that the two groups gained on the first and final quizzes, respectively, critical differences were found between them.

TABLE 5

Independent T-test Analysis of the Vocabulary Quiz Mean Score Differences between the QR Code-based and Paper-based Groups

Quiz	Levene's Test for Equality of Variances		*t*-test for Equality of Means						
	F	*Sig.*	*t*	*df*	*Sig.* (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Quiz 1	.548	.461	.287	94	.774	.0165	.0573	-.0973	.1303
Quiz 10	17.437	.000	8.089	94	.000**	.3137	.0388	.2367	.3907

*p < .05, **p < .01

As shown in Table 5, there was no statistically significant difference between the two groups' scores on the first vocabulary quiz (t = .287, p = .774), indicating that their vocabulary ability was similar at the beginning of the semester. However, statistically significant difference was observed between their last quiz scores. That is, those who were engaged in the QR code-driven vocabulary quiz gained much higher scores on the last quiz and also showed greater improvement than the paper-based group students.

In short, it seems that providing the vocabulary quiz via QR code had quite considerable effects on the students' positive perceptions and attitudes toward the QR-code driven quiz and their vocabulary learning outcomes. Further investigations on the students' perceptions through in-depth interviews might be needed for future research in order to ascertain if using the QR code itself for the vocabulary quiz would have positive influence on enhancing their vocabulary ability.

V. CONCLUSION

With the growing prevalence of smartphones in the daily lives of Korean university students, the QR code has become widely used within our educational setting as a way to quickly direct them to new information or webpage. The current study investigated the effect of using the QR code for language learning and teaching. To be specific, it attempted to examine how the use of the QR code for the TOEIC vocabulary quiz would affect Korean EFL university students' perceptions and their vocabulary improvement. Major findings were as follows.

First, the students' responses to the survey questionnaire showed that they were in favor of using the QR code for the vocabulary quiz. The students reported that the use of the QR code made them attend the class on time, get positive level of tension and responsibility,

study much harder, and thus greatly improve their vocabulary understanding and use. The majority of the students pointed out that they first felt uncomfortable because the given time for scanning the QR code and writing down their answers was limited. However, this in turn helped them increase their concentration on studying new vocabulary and taking the quiz.

Second, scores that the students in the QR code-based and paper-based groups obtained on the vocabulary quiz showed that the former had improved their vocabulary much more than the latter. It is thus concluded that using the QR code for the vocabulary quiz helped the students increase positive perceptions and vocabulary achievement.

While the previous research studies regarding the QR code (Fujimura & Doi, 2006; Y. J. Jeon & M. K. Kang, 2013; Rivers, 2009; Susono & Shimomura, 2006) only demonstrated advantages of using it for performing various language learning activities or getting students' feedback about the class content, the present study discovered that the use of the QR code as a medium of language testing was effective for not only increasing the students' motivation, but also enhancing their language ability. Here, it should be highlighted that the QR code would need to be used wisely with time constraints in order to help students stay focused and to maximize their language learning outcome.

To sum up, the findings of this study ensure that utilizing the QR code in a language classroom would be useful for learners to have better attitude and to promote their language learning under one condition, only for a brief time with teachers' strict supervision.

There is, however, a limitation that require further research. Since this study focused more on understanding the students' perceptions of using the QR code for the vocabulary quiz, their progress from the first to last quizzes was relatively given less attention. It might be worthwhile to observe more in depth how the students (compared to those in the paper-based group) would develop their ability of using new words/expressions appropriately within sentences. In order to do so, assessing the students' performance by using a more reliable rubric and having more than one examiners would be needed. Additionally, having interviews with several students and gathering more in-depth opinions might add critical information to future research.

REFERENCES

Chang, Sunyoung, & Kim, Hyejin. (2011). M-learning as a strategy for motivating student in the EFL class. *The Korean Journal of Educational Methodology Studies*, *23*(4), 713-727.

Cho, Seikyung. (2009). Smartphones used for foreign language learning.

Multimedia-Assisted Language Learning, 12(3), 211-228.

Choi, Eun-joo, & Jeong, Dong-bin. (2010). The effect of college students' vocabulary learning by using mobile LMS lessons. *Multimedia-Assisted Language Learning, 13*(3), 279-302.

Chu, Huiyoung. (2011). The effect of the features of smart phone vocabulary applications on Korean college students' satisfaction and continued use. *Multimedia-Assisted Language Learning, 14*(2), 91-112.

Fujimura, N., & Doi, M. (2006). Collecting students' degree of comprehension with mobile phones. *Proceedings of the 34th Annual ACM SIGUCCS Conference on User Services*, Alberta, Canada, 123-127.

Jang, Eunjee, Won, Eunsok, & Jeong, Dongbin. (2011). The effects of using Smartphones to assist lexical inferencing strategies in vocabulary learning. *Modern English Education, 12*(2), 342-367.

Jeon, Young-Joo, & Kang, Mun-Koo. (2013). A study of smart English teaching models using QR codes. *Multimedia-Assisted Language Learning, 16*(3), 125-143.

Ko, Myong Hee, & Goranson, J. (2014a). Learner perceptions and preferences of device type in vocabulary learning. *Multimedia-Assisted Language Learning, 17*(3), 37-67.

Ko, Myong Hee, & Goranson, J. (2014b). Technology-assisted vocabulary learning and student learning outcomes: A case study. *Multimedia-Assisted Language Learning, 17*(1), 11-33.

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). London: Routledge.

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

Lunden, I. (2015, Jun 2). 6.1B smartphone users globally by 2020, overtaking basic fixed phone subscriptions. Retrieved August 23, 2015, from the World Wide Web: http://techcrunch.com/2015/06/02/6-1b-smartphone-users-globally-by-2020-overtaking-basic-fixed-phone-subscriptions/#.kdfe9g:f9pU/.

Number of Smartphone Users in Korea Approaches 40 Million. (2014, August 25). *The Chosun Ilbo*. Retrieved August 23, 2015, from the World Wide Web: http://english.chosun.com/site/data/html_dir/2014/08/25/2014082501233.html.

Rivers, D. (2009). Utilizing the quick response (QR) code within a Japanese EFL environment. *The JALT CALL Journal, 5*(2), 15-28.

Robertson, C., & Green T. (2012). Scanning the potential for using QR codes in the classroom. *TechTrends, 56*(2), 11-12.

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. (2008). Investigating learner preparedness for and usage patterns of mobile learning. *ReCALL*, *20*(3), 253-270.

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

Susono, H., & Shimomura, T. (2006). Using mobile phones and QR codes for formative class assessment. *Current Developments in Technology-Assisted Education, 2*, 1006-1010.

Thornton, P., & Houser, C. (2003). Using mobile web and video phones in English language teaching: Projects with Japanese college students. In B. Morrison, C. Green & G. Motteram (Eds.), *Directions in CALL: Experience, experiments & evaluation* (pp. 207-224). Hong Kong: English Language Centre, Hong Kong Polytechnic University.

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

APPENDIX 1

Survey Questionnaire

1. 스마트폰을 하루에 평균 몇 시간 정도 사용하고 있나요?
   (1) 전혀 사용하지 않는다 (2) 1시간 이하 (3) 1-2시간 (4) 2-4시간 (5) 4시간 이상

2. 영어 학습에 있어 스마트폰을 하루에 평균 얼마만큼 사용하고 있나요?
   (1) 전혀 사용하지 않는다 (2) 1시간 이하 (3) 1-2시간 (4) 2-4시간 (5) 4시간 이상

3. 영어학습과 관련하여 주로 어떤 경우 스마트폰을 사용하고 있나요?
   (1) 단어공부 (사전 찾아보기)를 할 때
   (2) 토익/토플 등의 온라인 동영상 강의를 통한 영어능력 시험 공부 할 때
   (3) 영어문법/어휘/토익/토플 등과 관련한 자료가 올려진 블로그나 카페 등의 홈페이지 방문을 통해 공부할 때
   (4) 카톡/채팅/트위터/페이스북 등 SNS를 통한 외국인 친구들과의 영어 대화를 하는 경우
   (5) 기타 (어떤 경우인지 간략히 적어주세요:)

4. (이번 학기 이 과목을 수강하면서 사용한 경우를 제외하고) 다른 영어 학습에 있어 QR코드를 사용해본 적이 있는지요? 만약 있다면 어떤 영어 학습에 있어 QR코드를

사용했는지 간략히 적어주세요.

5. 이번 한 학기 동안 QR코드를 이용하여 단어퀴즈를 보았었는데 이것이 학기 초에 비해 토익단어 공부, 토익단어 실력향상 등에 있어 도움되었다고 생각하나요?
(1) 그렇다 (2) 아니다 (3) 잘 모르겠다

6. 만약 5번에서 1번 (‘그렇다’)를 선택한 경우 구체적으로 어떤 점에서 QR코드를 활용한 단어퀴즈가 좋았다고 생각하는지요? 이와 반대로 만약 5번에서 2번 (‘아니다’)를 선택한 경우 구체적으로 어떤 점에서 QR코드를 활용한 단어퀴즈가 좋지 않았다고 생각하는지요? (본인이 생각하는 한 두 가지 정도 장점 또는 단점을 간략히 적어주세요.)

7. 만약 이번 한 학기 동안 스마트폰과 QR코드 활용 없이 종이에 답안을 적어내는 방식으로 단어퀴즈를 보았다고 가정해보았을 때 QR코드를 활용을 통해 단어퀴즈를 보았을 때와 비교하여 둘 중 어떤 방식이 더 좋다고 생각하나요?
(1) QR코드를 활용한 단어퀴즈
(2) 종이에 답안을 적어내는 방식의 단어퀴즈
(3) 두 방식 모두 차이/상관 없음

Examples in: English
Applicable Languages: English
Applicable Levels: Secondary/Tertiary

Yoo-Jean Lee
Department of General Studies, College of General Education
Dankook University
152, Jukjeon-ro, Suji-gu, Yongin-si
Gyeonggi-do, 448-701, Korea
Tel: (031) 8005-3765
Email: dabin8201@hotmail.com

Received 15 September 2015
Revised 3 November 2015
Accepted 20 November 2015