Quick Response Codes in Foreign Language Instruction: Practical Ideas and Strategies

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Abstract

Quick response (QR) codes, composed of little black dots, are handy tools that are becoming more and more popular in our daily lives. Being commonly found on product packages, QR codes were first designed by a Japanese car manufacturing company. Ever since their license was made public, they have found their way not only into markets but also into educational settings. They are basically used to connect the analogue world to the digital one and help enrich traditional hardcopy materials commonly used in language classes. Their uses can be as limited as the creativity of teachers who are to use them in their classes. This paper attempts to provide a brief overview of practical techniques for using QR codes in teaching and learning of the language skills (reading, listening, speaking and writing) and content areas (grammar, vocabulary, and pronunciation). The paper ends with some recommendations for effective use. In brief, it aims to introduce innovative practices in the use of QR codes and to provide teachers, learners and researchers some insight into their use for educational purposes.

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Yabancı Dil Öğretiminde Karekodlar: Pratiğe Dönük Fikirler ve Stratejiler

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Öz

Siyah küçük noktalardan oluşan karekodlar günlük hayatımızda gitgide daha popüler hale gelmekte olan kullanışlı araçlardır. Günümüzde çoğunlukla ürün paketleri üzerinde bulunan karekodlar bir Japon otomobil üretim şirketi tarafından tasarlanmıştır. Lisansı halka açık hale getirildiğinden bu yana da sadece pazarlara değil eğitim ortamlarına da girmiştir. Bu araçlar temelde analog dünyayı dijital dünyaya bağlamada kullanılır ve dil sınıflarında yaygın olarak kullanılan geleneksel basılı materyalleri zenginleştirmeye yardımcı olur. Bu kullanışlı araçların eğitim amacıyla nasıl kullanılacağı, sınıflarında bu araçları kullanacak olan öğretmenin hayal gücü ile sınırlıdır; yani karekodların kullanımının ucu açıktır ve kullanım şekli öğretmenin bu araçları nasıl kullanmak istediğine bağlıdır. Bu çalışa, karekodları dil becerilerinin (okuma, dinleme, konuşma ve yazma) ve dil alanlarının (dilbilgisi, sözcük bilgisi ve sesletim) öğretiminde ve öğreniminde kullanmaya yönelik pratik teknikleri ve stratejileri ele almaktadır. Ayrıca karekodların daha etkin bir şekilde kullanılabilmesi için bazı önerilerde bulunmaktadır. Kısacası, bu çalışma karekodların kullanımları konusunda yenilikçi uygulamaları tanıtmayı ve bunların eğitim amacıyla kullanılması konusunda öğretmenlere, öğrencilere ve araştırmacılara fikir vermeyi amaçlamaktadır.

Anahtar Kelimeler: *Karekodlar, mobil öğrenme, yabancı dil olarak İngilizce, dil becerileri, dil alanları*

Önerilen Atıf

INTRODUCTION

A quick response (QR) code is a digital image that is composed of square dots. As an innovative tool, it is an improvement to traditional barcodes and have surpassed them in popularity. A QR code is able to hold much more information (4000 to 7000 digits) than barcodes (20 digits) (Mousa & El-Salam, 2016) and can be scanned from any angle without sending beams. They are more functional and easier to use than traditional barcodes as they come with several significant features, such as being able to hold more information (both numeric and alphabetic), higher reading speeds (from every direction), free software and mobile phones' being used as a reader (Susono & Shimomura, 2006).

QR codes were first created and used by a Japanese car manufacturing company to facilitate the tracking of car components during production (Abeywardena, 2017; Kossey, Berger, & Brown, 2015). Later in 2010, the company allowed this innovative product to enter public domain, meaning that anyone could use it for their own benefit (Çataloğlu & Ateşkan, 2014). Thanks to this license and the proliferation of mobile devices, QR codes are currently being used more and more frequently in various domains, particularly in advertising and business (Latif, Fadzil, Azzman, & Ng, 2011, p. 4). Fortunately, education has been no exception to this recent trend for QR codes, and according to Thorne (2016), they come with a number of instructional affordances.

A particular characteristic of QR codes is that it is relatively easy to construct and share them (Burns, 2013, January; Robertson & Green, 2012; Walsh, 2014, December), which means that they could be used as an instructional tool even by the non-tech-savvy (Rivers, 2009). Moreover, as Jeon (2015) noted, they can be highly useful for language teachers as QR code software can mostly scan and recognize them fast without problems and then take the user to the destination web site relatively quickly. From an Internet of Things (IoT) perspective, QR codes enable learners to interact with real objects in the classroom, at school or in the environment (Sbordone, Ferri, McCullough, Kaplan, Jeannette, Ko, & O'Connor, n.d.). Together with a smart phone or a similar mobile device that could be used as a reader, QR codes are able to establish fast connection between learners, teachers and digital materials (Hau et al., 2013, p. 54).

Although QR codes could be used to enrich paper-based instructional materials (Uluyol & Agca, 2012) and classroom instruction in general, their use for such educational purposes is not very common (Albastroiu & Felea, 2015; Gogova & Koceska, 2014; Hau et al., 2013; Hopkins & Bobeva, 2011; Law & So, 2010; So, 2011; Rikala & Kankaanranta, 2014). Research on educational uses of QR codes is also limited (Chapple, Weir, & San Martin, 2017) and there are even fewer studies in ELT (Thorne, 2016). Even in China, where QR codes are frequently used for daily activities, such as shopping, paying bills, sharing personal information and so forth, they are new to educational settings (Choung, 2017), and they are mostly used for administrative purposes at schools (Rivers, 2009). However, it should be noted that they are positively welcomed by educators who recognize their potentials (So, 2011). Similarly, in some research studies it was reported that preservice teachers found value in QR codes and expressed their desire to use them in their prospective careers (Ali, Santos, & Areepattamannil, 2017; Durak, Özkeskin, & Ataizi, 2016). It is actually easy to construct them, and they come with some potentials for teaching and learning, yet it might prove difficult for some people to incorporate them into learning materials or day-to-day instructional activities without some working knowledge of this handy tool.

Overall, a discussion of the pedagogical value of QR codes supported with illustrative examples showing how to use them could increase the prospects for the use of these innovative tools for purposes of teaching and research. Moreover, according to Ertmer (1999), barriers to adopting new tools or technologies include lack of awareness, need for specific training, low self-efficacy in trialing new tools or practices, outside constraints and concern for alignment with current instruction. If teachers are trained on how to use QR codes, then the barriers mentioned above could be eliminated (Vigil, 2017), and QR codes could be a part of language education. Aktaş and Çaycı (2013) support this by noting that the use QR codes could have an influence, not only on educators and learners but also on learning processes, so it is wise to revise how to use QR codes in foreign language education.

In short, for teachers to be able to use these user-friendly tools in their classes, they should first be aware of their existence and practicality. Furthermore, such awareness is also essential for researchers interested in the use of technology for teaching foreign languages. In this regard, this paper aims to disseminate information about QR codes from a pedagogical perspective. It could be a down-to-earth pedagogical

guide or a practical manual delineating how to use QR codes to teach a foreign language (or maybe do research on the use in foreign language classes), as it attempts to elaborate on instructional uses of QR codes and lays out practical paths to enable language teachers to make QR codes pedagogically relevant in their own instructional contexts. It is hoped that the ideas discussed and presented in this paper could help produce more sophisticated ones that could contribute to the theory and practice in technology-enhanced language learning. With these aims in mind, it provides background information about QR codes, describes their basic characteristics and presents ideas on how to use them for instructional purposes in teaching and learning the four language skills (reading, listening, speaking and writing) and the content areas (grammar, vocabulary, and pronunciation). It should be noted that although this paper discusses the results of major studies on the use of QR codes for foreign language instruction, it does not aim to provide a comprehensive overview of previous studies on this issue; as noted earlier, it highlights practical aspects of using QR codes to improve current practice rather than theory in technology-enhanced language learning.

POTENTIALS OF QR CODES FOR FOREIGN LANGUAGE LEARNING

Regarded as a "gateway" to the Internet (Baik, 2012; Thorne, 2016), QR codes offer several instructional affordances, which make them a useful tool for classroom use. They can be used to have quick access to online content (e.g., websites, videos, audios, and documents) (Jeon, 2015; Law & So, 2010; Thorne, 2016) and to eliminate the frustration caused by dealing with very long web addresses (Burns, 2013, January). In Figure 1, various materials intended for teaching/learning prewriting techniques are shared using QR codes. If the information is no more than 4000 to 7000 characters, a QR code can show the related information without connecting to the Internet (free text). Having access to online content using a QR code not only helps learners do a boring task quickly but also eliminates mistakes in writing (e.g., a web address). By using QR codes, language teachers could share answers to exercises, new words and their pronunciations, audios, videos, homework assignments, information on websites, presentations and many more. In this sense, QR codes function as a valuable tool for going paperless in the classroom. Another benefit of QR codes is that they could be used to increase learners' motivation and arouse their interest. Some research studies found that QR codes could help motivate students and add variety into lessons (Baruffi, 2015; Huah & Jarrett, 2014; Rikala & Kankaanranta, 2014). This is probably because the invisible information embedded behind the small squares in a QR code is likely to introduce some mystery (Thorne, 2016), and learners are generally fond of mystery (The Author, 2018a).

1. Free Text   2. Web Page   3. Video   4. PPT   5. Document

Figure 1. Quick access to online materials for a particular technique (prewriting techniques in this example)

Furthermore, given that it is relatively easy to create and use these codes (Burns, 2013, January; Robertson & Green, 2012; Thorne, 2016; Walsh, 2014, December), both teachers and learners could generate and use them without much practice. Law and So (2010) support this by noting that "the operations to retrieve or store QR codes are incredibly simple and quick, and with mobile devices, make them the ideal educational tools for teaching and learning" (p. 85). Moreover, using QR codes is a kid-friendly and safe activity as pupils could be directly guided to a particular website without being lost in search engines (Burns, 2013, January; Levin, 2017, June). They could be used for a wide array of purposes, ranging from enriching print materials by adding extra written or audiovisual information to preparing QR code-supported bulletin boards and from conducting polls to hiding answers in a worksheet (The Author, 2018a). Such augmented hardcopy materials are good at arousing learners' interest and boosting their motivation (Aktaş & Çaycı, 2013). Provided that teachers and learners have access to digital devices and an internet connection that is fast enough, QR codes could turn mobile phones and other mobile devices into pedagogical tools (The Author, 2018a).

PRACTICAL STRATEGIES FOR TEACHING LANGUAGE SKILLS

The following sections elaborate on how to use QR codes to teach the four language skills along with grammar, vocabulary and pronunciation. To demonstrate the practical techniques and strategies in context, this section also suggests activities. It is worth noting that although it's possible to use QR codes to teach all language skills, some lend themselves better to the use of these useful tools. For example, reading and listening are potentially more appropriate for QR-driven activities, while it entails certain level of creativity and reflection to create activities for productive skills (speaking and writing). In the sections that follow, a number of potential uses of QR codes are presented and some of them are supported using illustrative examples.

Receptive Skills

The receptive skills; namely, listening and reading better suit the use of QR codes. QR codes mainly function as an enjoyable shortcut to language input available on the Internet in oral and written modes. Better still, short passages could be embedded in the QR code and can be accessed without an Internet connection (Figure 1, QR code 1), whereas learners have to connect to the Internet to access materials larger in size, such as longer passages or audio materials embedded in QR codes. Below are details of how QR codes can be used in teaching reading and listening.

Globally considered, QR codes promise much as far as reading instruction is concerned. A school-wide reading activity is a worthwhile one. It is done by posting different QR codes around school and asking learners to find the pieces of stories and read them (Figure 2). While they are reading these pieces, they will have to scan the codes and read the contents to connect the bits and pieces. Such an activity could also be designed to improve listening skills as well if the written text is accompanied by audio files.

Part I   Part II   Part III   Part IV   Part V

Figure 2. A reading activity for the story "the Lottery" by Shirley Jackson

Another use could be to post QR codes around the classroom to guide learners to particular web sites to do research about a certain topic of interest. Several questions accompany QR codes to help learners what to look for in the web sites. This particularly suits younger learners as they should be guided to safe web sites for research. In such as case, QR codes function as a list of tasks and web sites in a webquest. Classroom teachers could print out several large dynamic codes and post them on the classroom wall. In each code, there is a certain reading material, such as a story, joke, poem, pun, riddle and so forth. The content of the codes can be changed (without replacing the codes) at regular intervals (i.e., each day, every other day or each week), so that learners get accustomed to checking the contents of each code and reading them. This is intended to help learners to develop good reading habits (Figure 3).

Story   Joke   News story   Poem   Riddles

Figure 3. A fun corner with lots of reading materials, such as stories, jokes, puns, riddles and so forth

Teachers can create a classroom library and stick QR codes to books to facilitate the access to the related movie trailers produced by learners or original ones stored on YouTube (if any). Similarly, learners could

create book synopses and share them on an online platform. QR codes could be stuck to books to enable learners to have access to them (on time, there and then). Learners and teachers could attach QR codes on the back cover of books in the school library to access such online information as book reviews by different people, similar books, information about the author of the book, other books by the same author, video reviews about the book or audio versions and so forth. Crompton, LaFrance and van't Hooft (2012) suggest connecting books in the library to reviews written by learners themselves. This could help learners to build a virtual reading club in which members discuss books they read and help each other in book selection.

Figure 4. A sample extensive reading activity (Adapted from The Author, 2018b)

In an extensive reading activity (Figure 4), QR codes were used to provide the learners with reading passages in an actual educational setting (The Author, 2018b). Each reading activity was composed of four sections: (1) The learners used the first QR code to read a short passage, with a title given at the top of each page. (2) They used the second code to vote on whether they liked the passage or not. (3) They used the third code to answer some easy comprehension questions. The learners used the first QR code to read a short text that could potentially arouse their interest, such as "Can the Great Wall of China be seen from space?" Then they voted on the passage to tell the teacher if they liked it or not. (4) There were two more codes that provided additional passages for narrow reading on the same topic. The sequence was repeated for more reading texts. The learners were also asked to vote on the titles of reading passages for the next week.

Teachers could help learners improve their listening skills as well by posting QR codes in the classroom or around school to distribute links to a wide variety of extensive listening materials on the Web. Audio versions of reading texts could also be shared. Such improvement could appeal to learners with auditory and visual learning styles. Teachers can also design listening corners, in which a wide variety of regularly updated listening materials could be shared. For instance, it is useful to attach one or two QR codes for daily news, presented in audio or written language. If learners are motivated enough, they will get accustomed to checking the daily news corner, and an in-class extension can be retelling of what the learners read, listen or watch in the daily news corner. Teachers could also use QR codes to post daily lesson objectives presented in an audio/video or provide learners with instructions for daily activities at

school, such as how to use the school library, how to join a club or a special interest group or to how participate in a competition. For the learners to listen to the teacher explaining how to do such real-life activities is expected to make the learning or watching activity more meaningful.

Productive Skills

In comparison with reading and listening (the receptive skills), it is more difficult to use QR codes to teach writing and speaking (productive skills). Nevertheless, language teachers could incorporate QR codes in speaking activities, rather than design activities solely based on QR codes themselves. For example, a jigsaw reading (or listening) activity presented to pairs of learners by means of two QR codes promotes lots of oral information exchange. Each learner in a pair scans the QR code given to him or her to read or listen to the content of the target website. After that, they try to complete the missing information by asking his/her partner some questions (Figure 5). Although such an activity looks like a mere imitation of the traditional version of it, the element of mystery introduced by the use of QR codes could make activity more enjoyable.
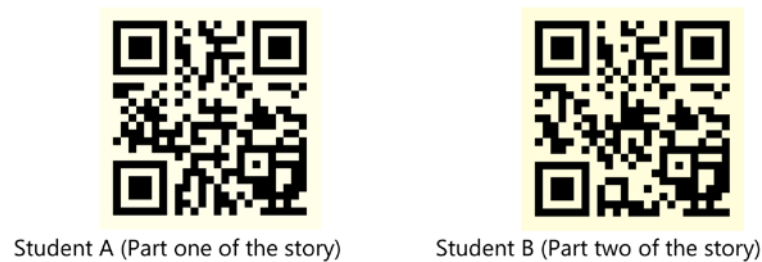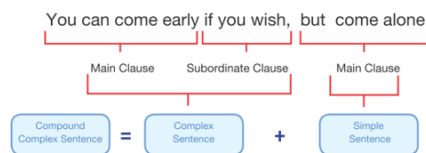

Student A (Part one of the story)   Student B (Part two of the story)

Figure 5. A jigsaw reading activity followed by oral information exchange to complete the missing part(s) in a story

Language Areas

The language areas (i.e., grammar, vocabulary and pronunciation) may be good candidates for QR code-based activities. For example, QR codes could be used to provide extended feedback to learners to help them learn grammatical rules. Grammatical explanations that accompany exercises could be supported with additional online materials (Figure 6). A particular way that teachers can use QR codes could be to prepare video explanations for major grammar rules, upload them to a video platform and post them as QR codes around the classroom or language laboratory. In addition to these, QR codes could be used to provide the answers to grammar exercises; learners are asked to do the exercises and check the answers.

Compound-Complex Sentences

As the name suggests, a compound-complex sentence possesses the properties of both a compound and a complex sentence. It is composed of at least two main clauses and a subordinate one. In other words, we must have at least two independent clauses and a dependent clause attached to one of these independent clauses. A compound-complex sentence can be as short as the one below.

You can come early if you wish, but come alone.

Main Clause   Subordinate Clause   Main Clause

Compound Complex Sentence = Complex Sentence + Simple Sentence

Scan the code on the left to watch a video comparing types of sentences.

Scan the code on the left to read additional explanations and sample sentences.

Figure 6. An enriched hardcopy material intended to teach compound-complex sentences (The main material was adapted from Bakla, 2014, p. 10.)

Vocabulary is another area in which QR codes could be used in a number of activities. In one particular activity, teachers could prepare vocabulary videos, in which they provide various information, such as pronunciation, meaning, sample sentences, collocation information and so forth and embed these videos

in QR codes and regularly post them in the class. This can also be done using vocabulary cards with QR codes (Figure 7).

Figure 7. A vocabulary card to be posted on the classroom wall

QR codes with vocabulary activities could be pronunciation-oriented as well. It is possible to prepare posters of words which are difficult to pronounce for majority of the learners in a class. The teacher takes a note of mispronounced words and prepares a poster with IPA transcriptions enriched with audio pronunciation embedded in a QR code (Figure 8). Posting words in different places around the classroom could help raise learners' awareness of problematic words and work on their pronunciation. Teachers could also post QR codes around the school with selected podcasts embedded in them, particularly those that focus on pronunciation. The teacher can post QR codes with links to pronunciation of these words. The QR codes could also include some practice exercises in audio or video form. Still another technique could be the use of QR codes as labels for real objects in the classroom. By scanning the code attached to an object (e.g., table, board, window, door and so forth), learners could not only hear the pronunciation of some vocabulary items but also study their meaning and see their use in context. Worksheets (e.g., those with some reading passages) could be enriched with audio pronunciations of particular words (Çataloğlu & Ateşkan, 2014). Similarly, the audio versions of reading passages could be attached in QR codes next to each paragraph, so that learners could shadow-read the passages and improve their pronunciation in this way.

chalet /ˈʃæ.leɪ/
mischievous /ˈmɪs.tʃɪ.vəs/
rendezvous /ˈrɒn.deɪ.vuː/
archive /ˈɑːr.kaɪv/
etiquette /ˈet.ɪ.kɪt/

Read the code on the left to hear the pronunciation of the words.

Scan the code to send an audio message to your teacher. Read the words aloud; record your voice and send it to your teacher using Vocaro.

Figure 8. A pronunciation poster enriched with QR codes

Miscellaneous Instructional Uses

In the broadest sense, QR codes are used to connect the analogue world to the digital one, thereby enriching the former by providing additional information or materials. In other words, QR codes function as a nexus between paper and the Web (Robertson & Green, 2012). This, according to Law and So (2010), promotes extended learning. For instance, the digital version of a learner-generated poster posted on a class bulletin board can be published in Glogster with colorful and interactive elements, so it can grab learners' attention and motivate them to view it. Providing both paper-based and digital materials (including multimedia) helps personalize learning as different learning styles can be addressed (Leone & Leo, 2011; Rikala & Kankaanranta, 2014). An additional benefit of augmenting printed materials using QR codes is that learners have access to the latest updates of the site as they contain the link to a website. Overall, QR codes have the power to transform frequently used traditional (printed) learning materials to hybrid ones (Aktaş & Çaycı, 2013).

The creative uses of QR codes are only limited with the imagination of educators. For example, the objects around the school could be tagged with QR codes and information about spelling, pronunciation and sample sentences could be shared. QR codes could also be used to give instructions for a wide variety of language learning activities, such as "*Scan the QR code below to listen to a dialogue between two friends talking about their personal experiences in a camping adventure they had had. Then write a short paragraph describing how the adventure looked like*". Downing (2015) suggests making a dice with a QR code on each side of it, functioning as a link to a short story, a visual and so on. The teacher can use such a dice to design group games or incorporate it in reading, listening or speaking activities. It is possible to establish reading, listening, grammar, and vocabulary corners around the classroom or school. Different colors for different language skills or areas could be used to raise learners' awareness of the activities presented. QR codes can also be used to share the links to polls and survey (Crompton et al., 2012; Law & So, 2010; Çataloğlu & Ateşkan, 2014) to get learners' opinion about anything relevant to learning materials, processes, techniques and so forth. In short, there is hardly a limit to how QR codes could be used in a language learning classroom.

GUIDELINES FOR EFFECTIVE USE OF QR CODES

According to Baik (2012), for successful implementation, QR codes should be a part of daily life, and digital devices used for decoding the QR codes should be a common asset among people. It is easier for a teacher to introduce them into the classroom if they are already popular in the society and people are already accustomed to them. This section offers a few guidelines for how to use QR codes efficiently. However, it should be noted what is suggested here might not be appropriate depending on the instructional context. Therefore, it is wise to judge their applicability in a particular learning context.

Providing Training

Chapple, Weir and San Martin (2017) view sufficient training before the introduction as a significant component of the integration of novel technologies into the classroom. They also suggest that learners should be provided with enough guidance about how to use the QR codes (through demonstrations), and adequate practice prior to use should be encouraged (p. 59). Moreover, contextual factors should be taken into consideration when introducing QR codes into the classroom. Even though the learning curve for QR codes is not steep neither for teachers nor for learners, they might seem confusing for some. For instance, some of the participants in Arikan & Özen's (2015) study reported that they had some technical problems including the use of QR codes. Therefore, it is useful to provide learners with some guidance on how to use them efficiently. To this end, short videos or written tutorials might work well.

Using Dynamic and Trackable Codes

There are several important criteria to consider when selecting QR code software. First, QR codes are divided into two categories depending on whether the content in the destination web address is editable at a later time or not. QR codes with non-editable content in the destination web site are called static codes, whereas those with editable stuff are referred to as dynamic codes. Therefore, teachers are recommended to use dynamic codes (Kossey et al., 2015) as they might need to make changes in the content of the QR code. In such a case, dynamic codes allow them to make the necessary changes without reprinting the code, which obviously saves time and paper. However, QR code software with the dynamic code feature are far more expensive than those with baseline features (static QR codes with no pictures embedded). The second key criterion is whether or not the QR software is equipped with tracking capability. From a learner analytics perspective (see Clow, 2013; Sclater, 2017; Zilvinskis, Willis, & Borden, 2017), it is usually important for teachers to know how many learners visited a particular website or did an activity. The tracking feature in most QR code software enables teachers to collect data about to what extent the learners take part in QR code activities. Such data could help them reshape their pedagogy. For instance, a teacher embeds the web addresses of reading passages in various QR codes and checks how many learners have read each passage. Then he/she could use such information for selecting texts for future work. Third, some QR code readers record the history of scans (So, 2011), which is another criterion for selection. This is particularly important when learners no longer have an internet connection or the code to scan. In such cases, the recorded information is retrieved and used easily. Taken together, using dynamic codes with tracking and scan recording features can add to the pedagogical value of QR codes in the classroom.

Avoiding Overuse

Teachers should not use QR codes too frequently in instructional activities in order not to turn this useful pedagogical agent to a run-of-the-mill tool. However, as learners need to access everday data on the Internet, QR codes could be used to facilitate it. Therefore, they get accustomed to using this tool. Too many of QR codes could cause learners to lose their interest in them, or as Kossey et al. (2015) warn, learners might feel overwhelmed if there are too many QR codes in printed materials. Therefore, it is wise to use them from time to time, if not too sparingly.

Coping with Challenges and Barriers against Effective Use

There might be several challenges or barriers against effective use of QR codes in educational settings. First, although QR codes are practical to use, financing could be a problem for some schools where digital devices and a reliable Internet connection are an issue. Therefore, the dynamics of the immediate economic and educational context in which QR codes are to be used are quite important. You need a mobile device to gain access to the content embedded in a QR code. In addition, teachers have to pay for most QR code software if they want to create dynamic codes. In this respect, using QR codes for educational purposes might be costly. However, it makes sense to take advantage of already existent technological infrastructure at school and mobile devices that learners already possess, and a thorough Internet search could yield fruitful results as far as cheap or free QR software is concerned (See Appendix). QR code readers are typically free and in recent years, and phone manufacturers have been including a reader in phone cameras as an inbuilt feature. This, according to Rivers (2009), has been a major factor in

the rapid adoption and use of this technology in Japan. Having an inbuilt QR reader in telephones adds to the user-friendliness of this technology.

Challenges related with hardware, software or connection obviously discourage learners from working with digital tools. For instance, Ali et al. (2017) carried out a study with 44 pre-service teachers to investigate the integration of QR codes in classes. The data suggested that the participants adopted a positive attitude towards the use of QR codes, finding them user-friendly and beneficial, yet a good number of them mentioned some challenges like poor Internet connection. The authors concluded that such problems might impede successful incorporation of QR codes in instruction. Similarly, Rivers (2009) used QR code cards in an EFL class. The results indicated that the learners who did not like working with codes, and the author cited the inability of their mobile phones to scan QR codes for their dislike. In other research studies, similar challenges were reported: expensive Internet access for teachers, inability of all devices to read QR codes and older teachers' not being good at using mobile devices and the Internet (Mousa & El-Salam, 2016), technical problems related with scanning QR codes, the lack of (or poor) Internet connection and high levels of anxiety over the use of technology (Chapple et al., 2017), lack of digital device ownership and the cost of Internet access (Latif et al., 2011), learners' being charged for mobile Internet access, lack of devices with a QR code reader or old devices' not being able to read QR codes and variability in the appearance of the destination websites (Susono & Shimomura, 2006) and connection problems (Durak et al., 2016). One should note that the negative findings from these studies do not result from QR codes themselves; they are mostly caused by lack of adequate technological infrastructure. In other words, the findings of these studies do suggest that QR codes could be successfully incorporated into instruction provided that sufficient training (to both teachers and learners) is offered and financial/technical problems are solved, particularly those pertaining to the Internet connection and device ownership. Fortunately, one can see that such problems are being minimized or eliminated in time as technology develops.

Cauley (2011) argues that mobile phones and the Internet could distract learners and cause them to get involved in off-task behavior, such as using social media, texting or checking email. However, it should be noted that learners might exhibit such off-task at any time as long as they are allowed to use their mobile phones at school. Therefore, the use of smartphones at schools is controversial, and there have been some countries which have banned smartphones at schools. Mobile devices could be useful if teachers provide learners with useful and fun learning activities as an alternative to games and similar stuff. As Naumann (2011) stated, educators "need to start using smartphones in a smart way" (p. 26). In other words, they have to think of pedagogical ways of using mobile phones and similar devices at school rather than banning them. This is because the latter is a disservice to learners as they are robbed of tools with a potential for improving their language skills by arousing their interest.

CONCLUSION

QR codes apparently offer a number of practical uses in the classroom, including but not limited to enriching print materials, arousing learners' interest and introducing some mystery into the classroom. QR codes, according to Thorne (2016), are an easy and efficient method of accessing authentic materials on the Internet. They support such basics of mobile learning as mobility, ubiquity and personalization of learning. They could also be used to add some mystery to ordinary classroom procedures. The novelty introduced by QR codes seems worth the effort spent for them, so it is wise to take this advantage of QR codes as long as this novelty effect exists. Another significant property of QR codes is that they are highly user-friendly, and they can be produced literally in seconds. Its users are free to choose the (online or off-line) software they like among a number of alternatives out there on the Internet.

However, QR-based activities may not motivate learners if the novelty effect diminishes or they are overused. Therefore, learners' motivation to use them should be monitored, and innovative activities should be introduced to further motivate learners. Variety and change are keys to sustaining interest in QR codes, while better internet connection, availability of mobile devices and providing training to teachers and learners could help minimize possible problems if not fully eliminate them. Furthermore, a QR code activity should be meaningful and purposeful; that is, if a better alternative is out there, it is sensible to use it instead of QR codes.

Finally, a word of caution is that most of these benefits or suggested uses of QR codes need to be tested through empirical studies. This is supported by various researchers (Ali et al., 2017; Chapple et al., 2017), noting that empirical research into the effectiveness of QR codes is rather scarce. There is need for such research studies because teachers' perspectives and what they value might be markedly different from

what learners think and what instructional tools they like. A particular issue to be researched could be the impact of long-term use of QR codes on learners' motivation to work with them and the perceived value of QR codes from the perspective of both teachers and learners. In addition, prospective research could focus on potential strategies for fighting off challenges and barriers that are likely to emerge during in-class practice. Researchers could also focus on actual benefits of QR codes when it comes to accessing to web content in contrast with using hardcopy materials or sharing web addresses with learners to enable them to access learning materials on the Internet more easily. In addition to the need for exploring value and usability of QR codes from the perspectives of learners and teachers, researchers need to carry out quantitative studies to test the effectiveness of using QR codes in improving students' motivation to access online materials and efficiency of access to such materials.

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APPENDIX: A LIST OF SAMPLE SOFTWARE FOR PRODUCING QR CODES

QR Code Producers

QR Code Reader	Feature	Cost	Web Address
Kaywa	Both	Subscription	http://qrcode.kaywa.com/?lang=de
BeeTagg	Dynamic	Subscription	http://www.beetagg.com/en/
uQR.me	Dynamic	Free trial + Subscription	https://uqr.me/
goQR.me	Both	Subscription	http://goqr.me
QR Codify	Static	Free	http://www.qrcodify.com/
QR Stuff	Both	Free + Subscription	https://www.qrstuff.com/
Visualead	Both	Free + Subscription	https://www.visualead.com/
Unitag	Both	Free + Subscription	https://www.unitag.io/pricing
The QR code generator	Both	Free	https://www.the-qrcode-generator.com/

Notes. (1) This list of QR code producers is by no means a comprehensive one, yet it includes free and paid services. Teachers are recommended to check these and others to choose the most appropriate ones that suit their needs best. (2) QR code readers are typically free. A simple search in Appstore or GooglePlay gives you tens of free QR code scanners (readers).

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