Integrating QR Codes Into ELT Materials

David T. H. Cruse
British Council Japan

Peter Brereton
Rikkyo University

Quick response (QR) codes, when scanned with mobile devices equipped with QR-code readers, allow a direct link to online content. Although they are ubiquitous outside the classroom, QR codes are yet to be seen extensively in language teaching materials. However, QR codes can make classroom activities more engaging and allow students to perform previously impossible or impractical tasks. This article outlines some ways in which teachers can use QR codes to enhance material containing images, reading, and audio. QR codes are also shown to have potentially powerful applications for increased learner autonomy and asynchronous learning. Despite reluctance from some teachers and institutions to use mobile devices in class, producing and using QR codes is very simple and can aid lesson preparation and classroom management. This paper proposes a set of 7 guiding principles for teachers hoping to incorporate QR codes into materials, based on the authors' experimentation and reflection.

クイック・レスポンス（QR）コードは、QRコードリーダーを備えた携帯機器でスキャンが可能で、オンラインのコンテンツと直接リンクすることができる。QRコードは至る所に存在するものの、語学の教材として幅広く使われてはいない。しかし、QRコードはアクティビティをより魅力あるものとし、以前には不可能であったタスクさえも可能とする。この論文は、教員がQRコードを活用することで画像や文章、音声を含む教材の質を向上させる方法の概要を説明している。またQRコードは、潜在的に学習者の多様性に応じた指導や自立学習の機会を増加させるための有力なアプリケーションでもある。一部の教員や教育機関が携帯機器の使用に消極的であっても、QRコードの使用は非常にシンプルで授業の準備や管理を補助するものとなる。QRコードに関する私たちの実験と内省に基づき、これらをマテリアルに組み込む事を望む教員に向けてここに7つの基本理念を提案する。

Invented in 1994 in Japan as a way of more reliably tracking vehicles through the manufacturing process (Law & So, 2010), quick response (QR) codes are now an unobtrusive yet ubiquitous part of daily life. They provide convenient direct links to websites and other online information for anyone with a smartphone or other mobile device with a QR-code reader.

QR codes are also sometimes referred to as "two-dimensional barcodes" (Furht, 2011), due to their black and white patterns and their ability to store data, yet they can be more quickly and easily created than their more traditional relatives, have a greater storage capacity, and a high error-correction rate, which means the code is still readable even if up to a third of the code is torn or damaged (Furht, 2011). Although this ease and convenience has led to their use in a wide range of different contexts, and although there is an increasing volume of research into QR codes in education in general, there are few practical examples of how they can be incorporated in English language teaching (Thorne, 2016).

After outlining how and why QR codes can be created by teachers, this paper presents ways in which QR codes can be used to supplement and augment lesson materials, with reflections from the authors' use of QR codes in ELT. This is followed by a discussion of the benefits and the limitations to their use and finally an introduction of some principles of good practice to consider when incorporating QR codes into lesson materials.

Creating and Using QR Codes for ELT Materials

QR codes can be very easily made by anyone on a QR-code creator website. These can quickly be found through an online search (one we have found reliable is https://www.qrstuff.com). To create a code, simply copy and paste a URL or other link into the field or type in plain text to be encoded. The resulting code can be downloaded and treated as an image file, as shown in Figures 1 and 2.

Figure 1. A QR link to a webpage (http://jalt.org).

Figure 2. A QR link to user-created text (using qrstuff.com).

Creating QR-code links and pasting them into materials can take a matter of seconds, yet before analysing how they can be used, it is first useful to consider why such materials may be of benefit to learners. Puentedura's SAMR Model (2006: Table 1), which describes the effect that technology can have on a lesson, provides one way to do this.

Table 1. Puentedura's SAMR Model (2006)

Stage	Use	Kind	Value
4	Redefinition	Transformation	Tech allows for the creation of new tasks, previously inconceivable
3	Modification		Tech allows for significant task redesign
2	Augmentation	Enhancement	Tech acts as a direct tool substitute, with functional improvement
1	Substitution		Tech acts as a direct tool substitute, with no functional change

Note. From http://www.hippasus.com/rrpweblog/

Realistically, QR codes can most easily provide links to resources that enhance the lesson materials, functioning as a substitute for nontechnology tools (Stage 1) or working to augment lesson tasks (Stage 2). For example, a series of discussion questions written for students in plain text and downloaded as QR codes for scanning (as in the example in Figure 2) might be a direct substitute for questions on a worksheet, or a QR-code link to a text to be read on a tablet has the potential to augment the reading activity, allowing the reader to zoom in on text, click on links within it, and use available technology such as dictionary tools or text-to-speech functions. However, it is also worth recognising that QR codes, by their very nature, can link to other activities that may be able to transform lessons, modifying (Stage 3) or completely redefining (Stage 4) a lesson. In this sense, the use of QR codes can be seen as "an enabler" (Rikala & Kankaanranta, 2014, p. 142), as "gateways for an infinite array of resources" (Thorne, 2016, p. 749), or as a tool to "bridge the gap between physical and digital content" (Johnson & Adams, 2011, p. 14).

This idea of QR codes as a *bridging tool* is a principal point. Although our daily lives are often dominated by the Internet, learning materials are still overwhelmingly printed on paper. In very few (if any) language learning institutions with face-to-face lessons do teachers solely produce digital materials for learners to access on a screen (with no paper element). Although there are a range of ways that QR codes can be integrated into lessons, most experiments have been with the aim to enrich paper-based lesson handouts (Chen, Teng, & Lee, 2010; Law & So, 2010; Rikala & Kankaanranta, 2012, 2014). QR codes are the ideal tool for this purpose.

Practical Uses and Benefits of QR Codes

Teachers can make QR-code links to be used at any stage of a lesson. Reasons to do so will vary depending on the learners and teaching context, but the authors' own observations show that they are particularly useful for the following reasons and sample activities.

To Add an Element of Surprise

A standard and engaging activity in language classrooms is to post photographs around the classroom in order to prepare learners for a later task, often as a prediction task or to stimulate discussion and help activate schemata. QR codes, linking directly either to images from online searches or images files in sharable storage, such as Google Drive, can be used as a direct substitute for the images here. This allows the teacher to have more control over the activity, as learners cannot see the images until the teacher directs them to scan the codes. More importantly, this increases student curiosity and helps keep the element of surprise, leading to "an additional catalyst for class participation" (Thorne, 2016, p. 748).

Instead of images, the teacher can input plain-text instructions or questions into the QR code generator, again adding a degree of excitement to tasks. This type of exercise also appears to have had success outside the classroom, embedding QR codes in the wider environment (Rikala & Kankaanranta, 2012) by way of trail activities, treasure hunts, and other outdoor activities (Lee & So, 2010).

To Augment the Use of Images

QR-code links to images often enable a significant augmentation to classroom materials and activities; they can allow for colour images whereas many printouts, due to institutional limitations, may be black and white. Furthermore, when viewed on a mobile device, it is possible to access extremely high-resolution images and zoom in to a degree that would be impossible on printed images. As an example, try scanning Figure 3 and magnifying the image. In fact, the variety of media that may be displayed is only limited by what can be found online and accessed through a direct link; instead of simply using images, interactive infographics or quizzes may also be integrated into the lesson. QR codes can then act as a bridge to resources that transform lesson tasks (Stages 3 and 4 of Puentedura's SAMR Model), thereby helping not only to engage learners but also vastly improving the options available to teachers in lesson planning.

Figure 3. High-resolution images not possible in print. Tokyo Tower gigapixel panorama. (http://360gigapixels.com)

To Add Greater Flexibility to the Use of Texts

A typical receptive-skills lesson involves all learners having the same limited number of reading or listening texts, but QR-code links can allow learners the autonomy to choose their own text from a far greater selection provided by the teacher. An example of this working in practice, in a lesson on cities, is to provide learners with a worksheet with pictures of a number of cities (each with a corresponding QR code) and ask them to discuss the cities and choose the one they would like to find out more about. The learners then follow the QR-code link, read the text, and make notes. This is a major transformation of the traditional reading lesson (SAMR Stages 3 and 4) in that it boosts learner autonomy, intrinsically motivates learners to read, and naturally creates a real communicative need for learners to report their findings to their peers who may have read other texts.

Teachers can include QR-code links in listening lessons with similar benefits, either with a range of different audio texts or with links to specific sections of the same text. An example of the latter is a 30-minute interview on YouTube, with QR-code links that open the video at different points; learners watch and make notes on only that section of the video then share their information. Another option is to link to teacher- or student-produced audio stored in Google Drive. In class, although learners may require headphones to listen effectively on mobile devices, they are able to control their own audio, selecting a comfortable volume for themselves and relistening to certain chunks as many times as they require.

To Make Lesson Preparation and Classroom Management Easier

Although the above approaches are conceivable without the use of QR-code links, logistically they would be very difficult for the teacher to implement. The reading lesson would require sufficient paper copies of each text, meaning that in a large class there might be hundreds of wasted copies. The teacher would also need to monitor very carefully in order to ensure learners are provided with the correct text and are on task, and the time needed for the teacher to print and prepare the texts would be impractical. For both lessons, providing learners only with the URLs would also have much more scope for error and would take valuable time away from the lesson. In contrast, by using QR codes, learners can be provided with a single handout, saving class time and minimising the use of paper. Having all the codes also allows learners to access every text in their own time if they wish, something that is often impossible particularly after a traditional listening lesson, thus encouraging deeper and more independent learning (Rikala & Kankaanranta, 2012).

To Aid Autonomy and Differentiation

QR codes can also be used to support autonomous learning in many ways, such as by linking to reliable dictionaries or glossaries relevant to the learners' context (i.e., mono- or multilingual, based on learners' level or their specific needs such as English for academic purposes [EAP] or English for specific purposes [ESP]). In addition, QR codes can provide links to correct answers or hints to exercises (written in plain text by the teacher or linking to an online document or webpage) and help guide learners through exercises (Kossey, Berger, & Brown, 2015; Law & So, 2010; Rikala & Kankaanranta, 2014; Walker, 2010). This has the advantage of allowing learners to work at their own speed and focus on their own personal areas for improvement. In addition, QR codes can be used to access resources and support for students with particular learning needs. For example, visually impaired learners could be given codes to link to a Word file of a handout, enabling them to magnify it or use read-aloud tools. Dyslexic learners might also find such tools useful, or teachers can provide class content in different fonts or colours that might not be possible to print at their institution.

Such differentiated use has powerful implications for many types of courses, whereby teachers can include QR codes in convenient locations on worksheets to add working instructions (Walker, 2010), remind students of key points to consider, or provide links to questions to consider or online examples and resources. McCabe and Tedesco (2012) researched the effectiveness of QR codes linking to instructional YouTube videos to aid maths homework, an idea that could surely be applied to ELT materials with links to videos of language explanations, pronunciation, or "how to" videos. We have similarly experimented with using QR codes on EAP courses to aid writing, by placing QR codes in the margins of writing homework sheets. Depending on level and course aims, we have used codes to provide reminders of what students are to consider prior to writing, what to include in different parts of the text, and to link to postwriting checklists for self-reflection. This has appeared to improve students' work, leading to fewer misunderstandings and greater attention to requirements.

For Practical and Institutional Reasons

Aside from teaching and learning benefits, language-teaching organisations also have much to gain by encouraging the use of QR-code links. Such materials can help avoid the potential copyright issues involved in reproducing and printing from online sources. From an environmental (and cost) perspective too, the use of QR codes helps reduce the amount of paper required for each learner, while still providing the learners with the same, or even a greater, amount of content.

Limitations of QR Codes

We have outlined how QR codes can be integrated into ELT materials and the benefits, including increasing learner engagement and motivation, boosting learner autonomy, helping teachers with materials creation, and aiding planning and classroom management. Despite these advantages, and although QR codes surround us in our daily lives, there are clearly still factors that limit their wider implementation in the language classroom.

The most often associated issues with the use of any technology in the classroom are the technical issues that can occur with connectivity (Kossey, Berger, & Brown, 2015). Although these are unavoidable in certain contexts, such as the use of QR codes in activities outside the class (Rikala & Kankaanranta, 2012), the risk can be minimised by checking the Internet connectivity in the classroom and also by planning a suitable alternative option. In practice, in Japan, many language-teaching organisations have their own reliable Wi-Fi networks and the vast majority of learners own a smartphone with good connectivity. Although slow QR-code reader applications were also cited by Chen et al. as a potential barrier in 2010, this is less of an issue in 2018; QR-code readers nowadays tend to react to codes almost instantaneously.

Another potential technical issue, if learners are using their own devices, is the requirement to have a QR-code reader application. Teachers have the responsibility

to inform learners in advance if the learners are to use their mobile devices in a future lesson. Teachers should also request that the learners download a free QR-code reader onto their phones. Nowadays, this is less of an issue, as modern smartphones often have QR-code reading facilities built into their camera applications. Although it is still not uncommon for learners to be unfamiliar with using QR codes, it is our experience that, once explained, even the most tech-averse learners (and teachers) quickly become accustomed to using them.

More serious issues involved with integrating QR codes into ELT materials include the possibility that their use might actually detract from the substance and lesson material (Rikala & Kankaanranta, 2012). Context is key here and, as with any tool, teachers should take careful measures to ensure the use of QR codes is not a gimmick (see Principles of Good Practice, below) and that it adds value rather than detracting or distracting from the lesson. An example is embedding plain-text questions or instructions in QR codes, which we have already discussed as a potentially engaging use to create interest and surprise. However, for many classes it might be more appropriate to have traditional printed questions, rather than creating a barrier to the class reading them. Additionally, using mobile devices in the classroom can be distracting for some learners, especially younger ones. In the case of either classroom management or behavioural issues, the teacher will need to negotiate rules with learners for the appropriate use of devices.

Principles of Good Practice

The authors' experiments using QR codes on a wide variety of courses have generally been well received by both learners and teachers, but some materials have been less successful. Like so many teaching and learning tools and methods, context is key—what might seem like a gimmick in one class could be an engaging lead-in in another. With this in mind, we have developed the following seven broad principles for teachers to consider when planning to include QR codes in their printed teaching materials.

They should not be a gimmick.

The use of QR-code links in materials can easily become "tech for tech's sake." Whenever possible, we should attempt to use technology in a meaningful way to augment the lesson materials. Indeed, as others have found that using QR codes can demotivate and frustrate learners when used excessively or in badly planned tasks (Rikala & Kankaanranta, 2012), the aim of Principle 1 is to encourage judicious use of QR codes.

They should work to engage learners.

Following on from the first principle, excessive use of QR codes might cause their novelty to wear off. We have found that QR codes are particularly effective in lead-ins to lessons, engaging learners with low motivation to discuss questions and images that they would not otherwise have engaged with. However, as a learner in Rikala and Kankaanranta's 2012 study stated, "Everyone concentrates better when the teaching is varied" (p. 6).

They should encourage learner autonomy.

QR codes clearly have the capacity to promote learner autonomy, and we feel they should, as far as possible, be used to do so. This principle encourages us to consider that by including links to online resources, the materials we are creating are no longer just the "here and now" of a textbook or worksheet page.

They should facilitate the lesson flow.

This principle is born out of some teachers' reluctance to implement QR codes due to a fear that they require laborious setting up and can interrupt learning. However, as seen in our examples of using QR codes to link to online reading and audio texts, QR codes should and can help facilitate the lesson flow and make both teaching and learning easier, not harder.

They should make materials preparation easier, not harder.

As teachers, our preparation time is often spent on formatting handouts, printing, photocopying, cutting up cards, counting, and organising piles of worksheets. Using QR codes should lessen this burden whilst expanding the range of materials accessible to us in the classroom.

They should add value to learning materials.

QR codes can be used simply to substitute for standard materials but, as far as possible, should be used to augment and link to other resources that can modify and redefine the possibilities of an ELT lesson.

They should encourage the use of authentic materials.

This principle relates to many of the others. The Internet is now most teachers' go-to source of authentic learning materials. It follows, then, that we can and should direct our learners to the variety of engaging content that is available.

Conclusion

The few studies into the potential of QR codes in ELT materials clearly show that the majority of both teachers and learners react positively to the use of QR codes. In terms of the SAMR model (Table 1), QR codes can help augment the learning experience (Stage 2), and even enable teachers to completely reimagine and redefine their lessons (Stages 3 and 4), simply by pasting links into printouts.

Despite this, it is also clear that there remains some scepticism from teachers (Rikala & Kankaanranta, 2012) due to the perception that planning lessons using QR codes can be time-consuming, and the lessons themselves can be daunting for those unfamiliar with technology. Learners may also be cynical about the use of QR codes, especially when the implementation of technology shifts the focus of the lesson from the learners to the technology itself. As a result, the authors suggest a need for a principled approach to the creation of such materials by providing a basic platform and lesson-planning scaffolding for teachers wishing to begin integrating QR codes into their own materials.

More research is clearly required in this emerging area of ELT materials, and the authors urge fellow teachers to carry out teacher-led action research or keep reflective teaching journals on their use of QR codes in a wider range of contexts—both at different lesson stages and with a variety of courses—and to collect student feedback on their use.

Irrespective of context, good teachers constantly strive to improve themselves and their lessons, reinventing and redefining ways to engage and motivate learners to interact more with each other and to prepare them to use English outside the classroom. These teachers will not be left short of ideas of how to incorporate QR codes into their materials; a simple online search will reveal a growing number of suggestions, and it is surely only a matter of time before OR codes are also adopted by published textbooks to offer learners further support and additional resources. We all carry entire libraries of global information in our pockets and have a world of knowledge at our fingertips, to which these little squares offer a convenient shortcut.

Bio Data

David Cruse is on-site courses and ICT coordinator at the British Council in Tokyo and is also a Delta Local Tutor. Since 2001, he has taught English in both the U.K. and Japan. He holds a Delta and an MA in applied linguistics and TEFL, and his current interests include materials creation, vocabulary learning, and teacher development. <david.cruse@britishcouncil.or.jp>

Peter Brereton is a program manager at Rikkyo University's Center for English Discussion Class, and is also a Delta Local Tutor and External Assessor. He has worked in Germany, France, Latvia, Spain, Australia, Ireland, and the U.K., and has been in Japan since 2012. He holds a Delta and an MA in TESOL, and his current interests include feedback methods, teacher professional development, and academic management. <brereton.peter@gmail.com>

References

Chen, N.-S., Teng, D. C.-E., & Lee, C.-H. (2010). Augmenting paper-based reading activities with mobile technology to enhance reading comprehension. In U. Hoppe, R Pea, & C.-C. Liu, *Proceedings of the 6th IEEE International Conference on Wireless, Mobile, and Ubiquitous Technologies in Education* (pp. 201-203). Differently titled version retrieved from http://wportfolio.wzu.edu.tw/ezfiles/0/1000/academic/42/academic_74538_7320148_05917.pdf

Furht, B. (2011). *Handbook of augmented reality*. New York, NY: Springer.

Johnson, L., & Adams, S. (2011). *Technology outlook, UK tertiary education 2011-2016*. Austin, TX: The New Media Consortium. Retrieved from https://issuu.com/iglassbox/docs/technology_outlook_in_uk_tertiary_education_2011-2

Kossey, J., Berger, A., & Brown, V. (2015). Connecting to educational resources online with QR codes. *FDLA Journal, 2*(1). Retrieved from http://nsuworks.nova.edu/fdla-journal/vol2/iss1/1/

Law, C.-Y., & So, S. (2010). QR codes in education. *Journal of Educational Technology Development and Exchange, 3*(1), 85-100. Retrieved from https://aquila.usm.edu/cgi/viewcontent.cgi?article=1011&context=jetde

McCabe, M., & Tedesco, S. (2012). Using QR codes and mobile devices to foster a learning environment for mathematics education. *International Journal of Technology and Inclusive Education, 1*(1), 37-43. https://doi.org/10.20533/ijtie.2047.0533.2012.0006

Puentedura, R. R. (2006). *Building upon SAMR* [PowerPoint presentation]. Retrieved from http://hippasus.com/rrpweblog/archives/2012/09/03/BuildingUponSAMR.pdf

Rikala, J., & Kankaanranta, M. (2012). The use of quick response codes in the classroom. In M. Specht, M. Sharples, & J. Multisilta (Eds.), *Proceedings of the 11th Conference on Mobile and Contextual Learning* (pp. 148-155). Retrieved from http://ceur-ws.org/Vol-955/papers/paper_40.pdf

Rikala, J., & Kankaanranta, M. (2014). Blending classroom teaching and learning with QR codes. In I. A. Sánches & P. Isaías (Eds.), *Proceedings of the 10th International Conference Mobile Learning* (pp. 141-148)*.* Retrieved from https://files.eric.ed.gov/fulltext/ED557237.pdf

Thorne, T. (2016). Augmenting classroom practices with QR codes. *TESOL Journal, 7*(3), 746-754. https://doi.org/10.1002/tesj.257

Walker, C. (2010). *QR codes: Applications in education* [PowerPoint presentation]. Retrieved from https://www.slideshare.net/cawa/qr-codes-applications-in-education