

## **CHAPTER 2 – REVIEW OF THE LITERATURE**

### **Introduction**

The following articles review the evolution of how teachers have provided audio media examples during the instruction of foreign languages. The literature then centers on the possibilities for creating and using QR codes to provide access to audio supports via mobile technology during the acquisition of a foreign language in secondary schools.

### **Definition of Terms**

#### **Auditory Input**

For the purposes of this study and paper, ‘audio’ or ‘auditory’ input will refer to examples of the target language that are spoken aloud either by human or computer voice without the addition of static or video images. The exploration of audio resources in this paper generally excludes that delivered through specifically-designed software or computer-assisted language learning environments, including online courses.

#### **Quick Response (QR) Code**

A QR code is a 2-dimensional bar code that consists of a series of black and white squares. The larger squares in the corner hold no data, but instead serve as guides for the alignment of the code when scanned by a camera-enabled mobile device. QR codes can link to many different kinds of digital resources, including a web page, image, video, audio track, phone number, text message, contact information, or plain textual content.

### ***The Evolution of Theory and Practice in Using Audio Media for Language Learning***

#### ***Pre-Media Approaches***

#### ***The Audio-Lingual Method***

*Audio-lingual approach and the shift toward more communicative methods.*

*Language Labs*

### ***The Communicative Approach and Comprehensible Input***

*Importance of input for language acquisition; various ways that media can support FL learning:*

*“To acquire listening and speaking proficiency, the input must be oral, for example, the voice of the teacher, voices of native speakers, radio and TV broadcasts, books on tape, movies, and video clips. Exposure to input means being exposed to target language texts while trying to understand them. P. 26” Also discusses previous difficulties in creating media resources (Chan, Chin, & Nagami, 2011).*

### ***Current and Emerging Theory and Practice in Providing Audio Input for Language Learners***

#### **Cognitive Load Theory**

This theory developed by John Sweller (1988) examines cognitive problem-solving and puts forward the idea that learning can be described as the process of solving a problem, or moving from the “problem state” to the “goal state” (p. 260). If learners overload their ‘cognitive processing capacity’ during attempts to solve the problem, this may prevent learning from taking place, as the brain has no ability to create schema while it is occupied with other tasks (p. 261). As a result, the learner may successfully ‘solve’ the problem yet still not gain knowledge that one might expect would result from this kind of traditional problem-solving practice commonly used in educational settings (p. 284).

The implications for this theory are that teachers should design instruction and materials to reduce the cognitive load placed on the learner as much as possible so as to allow him to maintain enough cognitive processing capacity to spend on the building of knowledge schema.

*In recent years, Sweller and others have built upon the original theory...*

## ***Mayer's Multimedia Principles***

*Overview of multi-media principles and e-Learning  
Discuss Modality Principle and Redundancy Principle*

*Provide recommendations for audio supports alone apart from video; benefits and drawbacks*

*Associated research*

*Examined video and audio supports in foreign language learning. Video found to be more effective but some evidence that audio alone can be useful when images/action from video can take focus away from comprehension (Rahmatian, 2011).*

*Mayer 1997*

*Mayer's Multimedia principles, including adding audio to support text, and better to have audio narration and image than audio, written text, and image (Clark & Mayer, 2008).*

*Mayer, 2014*

*Multimedia Learning in a Second Language: A Cognitive Load Perspective  
Some benefits to video with slow narration, not seen with onscreen text*

## ***Differentiation and Universal Design for Learning (UDL)***

*Looks at possible indicators to identify students who may struggle in FL classrooms.  
Discusses areas of concern in FL acquisition, including auditory discrimination. Suggests presenting information with audio and teaching through more than one modality (DiFino & Lombardino, 2004).*

*Results consistently showed that participants with FLLD have phonological processing and memory deficits (Palladino, 2008,.p. 620)*

*“The findings postulated that Chinese dyslexic children also encounter problems in learning English as a second language, and they are almost weak in phonological processing both in Chinese and English.” (p. 160) Many dyslexic learners struggle with both reading and listening comprehension. (Ghazaleh, 2011, .p. 164)*

*In support of UDL for all students learning a **foreign** language. Many suggestions for including Internet resources and audio to support FL learning, including Web 2.0, collaborative docs, CD, podcasts. “The researchers at CAST (Rose & Meyer, 2002; Rose, Meyer, & Hitchcock, 2005) suggested that media such as digital text, digital images, digital audio, digital video, digital multimedia, hypertext, and hypermedia have malleability that can provide opportunities for learning that may not be possible with print text and traditional teaching methods (Rose et al., 2005).” (Castleberry & Evers, 2010).*

### **Possible Benefits of Utilizing QR Codes and Mobile Technology for Creating and Linking to Audio Content**

#### **Mobile Technology for Language Learning**

Smartphone ownership in the United States is increasing at all age levels, with the most rapid gains in the 12-18 year old range. Surprisingly, there does not seem to be a correlation between teen ownership of smartphones and socio-economic status (Madden, et al., 2013). This trend opens opportunities for teachers to use ‘bring your own device’ (BYOD) methods to incorporate more technology into their classroom teaching and to assign homework that requires access to the Internet.

A wide variety of mobile learning (m-learning) methods have been tried with success to support the teaching and learning of foreign languages. Teachers can provide individual vocabulary words, grammatical examples, dialogues, or examples of prose in the form of audio podcasts that students can download and access on a mobile device (Dickerson, J. & Browning, 2009). They can also set up mobile devices to act as reference materials for students as an alternative to a paper dictionary or textbook (Aqib & Asim, 2012, p.9). As part of the assigned class- or homework, the foreign language teacher may encourage the use of mobile devices as a

way to check translations or even to record oral practice with the foreign language for reflection or assessment (Kolb, 2008, p. 715). Smartphones can be used for ‘mobile blogging’ when out of the classroom in authentic contexts (Comas-Quinn, Mardomingo, Valentine, 2009). There are many applications (apps) now designed for use on mobile devices such as tablets and smartphones that can help people learn or refine a foreign or second language, and some studies show ‘significant gains in vocabulary knowledge’ among students who utilize them regularly (Wu, 2015).

Unfortunately, many teachers and students are unaware of the benefits of using mobile technology to support foreign language learning (Woodcock, Middleton, Nortcliffe, 2012, p. 1), or reluctant to allow it in a learning context for fear of distraction and misuse (Kolb, 2008).

### **Quick Response (QR) Codes**

A Quick Response (QR) code is a two-dimensional barcode in the form of an image comprised of small black and white squares. Unlike UPC codes, QR codes store information in both vertical and horizontal directions, thereby having the ability to display more than 1000 “characters” that can store up to several pages of information (Lai, et. al, 2013, p. E58). These codes were originally developed in the mid-1990’s for use in automotive factories in Japan (Shin, 2012), but their use spread rapidly to the advertising industry.

There are several free web tools and mobile applications that allow users to create and track QR codes, including Kaywa (<http://qrcode.kaywa.com/>) and Myqr (<http://myqr.co/>). Creating the code takes a matter of seconds; once the web link or content is entered into the web site interface, the QR code is automatically generated. It can then be saved as an image (.jpg or .png) and printed or embedded into word processing software or Internet pages.

In order to interpret the QR code, the user must install a QR code reader on a mobile

device, such as a smartphone, that also contains a camera. After opening the application, the camera on the mobile device acts as scanner that 'reads' the QR code and interprets the binary patterns. QR codes can link to a URL leading to any type of web-hosted content, such as a web site, online video or image, or audio track. When a user scans the QR code with a smartphone, the application will decode the information and route the user to a web address using the default browser. Additionally, QR codes can be linked to textual content that does not pull from the Internet, making it operable even when the user's device is not connected to a cellular or Wi-Fi network.

### **Transmedia with QR Codes**

Transmedia materials are those that allow the user to 'cross media' from a physical object, such as a piece of paper, to a digital resource (Cohen, Smolkin, & Bull, 2011, p. 238). While it has always been possible to refer readers of a paper or book to a digital reference through the listing of a web address (URL), the length and complexity of typing in long URLs made this technique impractical to use, especially with younger learners. Including a QR code instead allows users to instantly access the digital material linked to the code with any mobile device that includes a camera and QR scanning application without needing to type in long strings of characters.

Teachers in several contexts have experimented with using QR codes as a way to enhance learning activities that have traditionally relied on other formats as the single source. For example, one use of QR in a physical education class allowed students to view short video clips of people performing physical activities at three skill levels, thereby helping the teachers differentiate instruction to the current needs of the students (Adkins, Wajciechowski, & Scantling, 2013).

Another use of QR codes in an educational setting centered on how teachers used them to provide “additional activities that scaffold, focus, extend or support students to get started” in an elementary math classroom. The results were promising for the use of QR codes as a means of differentiating instruction and to encourage students to work more autonomously “by identifying which route is most appropriate for them” (Leahy, 2013, p. 28).

QR codes have shown promise in keeping students engaged in learning tasks when used in ‘treasure hunt’ activities outside of the classroom, either in outdoor natural settings or on field trips at museums and indoor places of interest (Rikala & Kankaanranta, 2012). In one such study, elementary students successfully used QR codes with an application specifically designed for gathering information related to science content in the field (Kamarainen, et al., 2013).

### **QR Codes for Language Support**

Research that examines the use of QR codes in language-learning contexts has yielded mixed results in regards to how this method of quick access to resources may affect language acquisition. In one study, students were provided with scaffolded questions that they accessed via QR codes while reading. It was determined that using the scaffolded questions did cause significant gains in understanding the texts, but that “direct access to digital resources using QR codes” did not in itself impact reading comprehension. In a follow-up survey to the intervention, however, the students favored the combination of print and digital resources, even though there were some technical glitches that sometimes made the access inefficient (Chen., Teng, Lee, & Kinshuk, 2011).

Much of the research involving QR codes has focused on their use in English as a Second/Foreign Language contexts. One study involved college freshman using a specially-designed augmented reality system by which they could access web pages including audio

materials by scanning QR codes. The students reacted favorably to the way that they could easily access the material via mobile devices anywhere on campus and indicated that they would like professors to use similar instructional methods in other courses (Tsung, Tan, & Chu, 2010, p. 48). Another study looked at combining paper-based and technology-enhanced learning in EFL contexts in an effort to see how personalization and flexibility of learning were affected (Leone, & Leo, 2011, p. 328). The results again demonstrated that the learners reacted very favorably to the way that they were able to easily access the materials via the QR codes.

### **QR Codes for Audio Support**

Attempts at using QR codes to link learners to audio supports in the target language show early promise. Suggested classroom applications include audio recordings and podcasts to accompany lessons, a QR Code “word wall” for vocabulary development, and a link via QR code to a dialogue in the foreign language (Hopkins, 2013, pp. 38-43).

One rationale for creating custom audio recordings that students can access via QR codes is that traditional prepared materials on CDs or DVDs “may not be flexible enough to cater for the diverse needs of the teachers” and “must be pitched at the right level of difficulty” (Law, & So, 2010, p. 94). Creating several different levels of audio recordings that students can scan via a QR code is a low-cost solution to differentiating instruction. If teachers know that students all have access to Internet-connected mobile devices outside of the classroom, including QR codes on homework papers can allow them to easily access and study supplementary materials such as audio recordings (Crompton, LaFrance, van ‘t Hooft, 2012).

When first implementing new methods involving technology, teachers must be aware that the novelty effect of experimenting with a device or application may diminish after repeated use, therefore negating any perceived benefits of increased student engagement or motivation. This

'wear-out' effect (Wang, 2014, p. 217) may also occur with the use of QR codes, but as this technology is new to most educational settings, there are presently no studies that investigate any long-term trends in student use of QR codes.