TEACHING AND LEARNING WITH AUGMENTED REALITY

ABSTRACT
Augmented Reality (AR) is a form of virtual reality which has been defined by many as any technology which blends real and virtual information in a meaningful way, and which can be implemented using a variety of devices, such as computers, mobile phones and tablets. As well as being commonly used by the general public in our day to day lives, AR has many affordances in the context of education. In the language classroom, AR is believed to enhance learning and prolong retention of information through its mix of audio, video, text and animation, as well as the realistic simulation of real-world environments, allowing the user to engage with the virtual world, supplementing the real-world surroundings with text or images. The four key beneficial features of AR for educational purposes are: the opportunity for collaborative and situated learning, the possibility of immersion in a previously unavailable or unlikely context, the potential visualisation of the invisible, and the provision of a bridge between formal and informal learning. This article will explore the background of AR in education, with particular focus on the use of AR in the language classroom.

BACKGROUND IN EDUCATION
Augmented Reality allows the user to engage with the virtual world, supplementing the real-world surroundings with text or images. As well as allowing learners to work with objects that they may not be able to access physically, research into AR suggests that it has four key beneficial features for educational purposes: the opportunity for collaborative and situated learning, the possibility of immersion in a previously unavailable or unlikely context, the potential visualisation of the invisible, and the provision of a bridge between formal and informal learning.

INTRODUCTION
This article will provide an introduction into Augmented Reality, and will examine its current and future potential in language education.

WHAT IS AUGMENTED REALITY?
Augmented Reality is a form of virtual reality which has three basic features: a combination of real and virtual worlds, real-time interaction, and accurate 3D registration of virtual and real objects (Azuma 1997), but has been defined by many as any technology which blends real and virtual information in a meaningful way (Klopfer 2008). While Augmented Reality is often associated with futuristic technology, usually involving headsets and headphones, it can actually be implemented using a variety of devices, such as computers and mobile devices such as smartphones and tablets. The uses of Augmented Reality are many and varied – from every-day functions in satellite navigation systems like Google Maps, to Instagram filters, as well as professional uses such as flight simulation and 3D medical technology, AR is now a normal part of life for many. In the context of education, in particular the language classroom, AR is believed to enhance learning and prolong retention of information through its mix of audio, video, text and animation, as well as the realistic simulation of real-world environments (Chang et al 2010).

BENEFITS OF AR TO LEARNERS
The ubiquity of smart mobile devices among learners allows for previously impossible collaborative learning, using tools which are often easily accessible and user-friendly. These tools often encourage, or require, learners to engage with the subject outside the classroom in a practical context. Collaboration through mobile interaction could enhance learners’ social
Recent research has indicated that learners respond positively to the ‘authenticity’ of the subject matter when engaging with content through AR, as well as fostering learner autonomy through the often self-directed nature of many AR educational tools. AR in the classroom context has been suggested to improve learners’ technological literacies (Squire and Jan 2007), as well as increasing engagement. AR also appeals to multiple learning styles through its combination of audio, visual, textual and 3D content (Yuen 2011), allowing learners to interact with the target content in different ways (Wojciechoski & Cellary 2013). Gamification of language learning using AR technology is also increasing in popularity, for example in the case of ‘Quest-Based’ mobile learning, which sees learners following clues prompted by environmental triggers in order to prompt use of the target language.

### TASK-BASED AR IN LANGUAGE EDUCATION

AR is believed to have great potential in the field of language learning; although immersion in the language community of the target language is considered to be one of the most effective ways to improve language proficiency (Yang 2011) not all learners are able to avail of such opportunities. AR allows for the replication of the immersion context without leaving the learners’ L1 environment. Several recent studies have found that the use of Augmented Reality in the English Language classroom was a strong contributing factor in learner motivation, and correlated with successful learning outcomes among university students, particularly in the area of vocabulary learning (Serio et al 2013; Ibanez et al 2011; Solak & Cakir 2015).

Early studies in using AR in the language classroom were centred around the teaching of vocabulary, such as a 2004 study in Japan which found that using a mobile AR tool to teach body parts to Japanese schoolchildren resulted in higher levels of uptake than when traditional, classroom-based methods were used (Tan and Lui 2004). Other studies in the teaching of vocabulary using AR were conducted in Spain and Portugal (Perez-Lopez & Contero 2013; Barreira et al 2012) and both reported increases in motivation, target language uptake and classroom performance than traditional methods of vocabulary teaching.

As well as vocabulary, AR has also been explored as a tool for developing literacy (Silva et al 2013); an AR ‘pop-up book’ was developed by Mahadzir & Phung (2013) as a tool for motivation and support in English language learning, and reported that the tool contributed to all-round improved performance after a year’s usage in the primary classroom.

AR can now be easily accessed through teachers’ and learners’ mobile device, with technologies such as QR codes. The use of QR codes in language learning has gained popularity in recent years owing to its relative ease of use for both teachers and learners, as well as the lack of material preparation required. QR codes, which learners can easily scan using their mobile phones, are used both outside the classroom, in location-dependent situations, and inside the classroom as part of printed materials. The incorporation of location-based AR for English Language learning was tested in a 2010 study, which incorporated QR codes into a “context-aware” AR device which used maps to access “learning zones” in real-time. This study reported high levels of satisfaction with the tool by university students, who used it for English language learning (Lui et al 2010).

### HOW CAN WE USE TASK BASED AR IN THE CLASSROOM?

This section will highlight three examples of easy to access AR for classroom use.

#### QR Codes

O’Sullivan (2017) suggests uploading QR codes to student messenger groups to eliminate the need for hard copy printing, and expands the use of the resource into listening tasks as well as lexical or grammatical tasks. An example of this is a jigsaw listening activity. The listening file is broken into sections, each represented by a QR code. Learners scan the codes to play the files and organise them into their correct sequence. QR codes can also be used effectively in vocabulary teaching – codes containing new or previously learned lexis can be produced for use in pair or group activities, with prompts, examples or definitions shown once the code has been scanned. Lastly, the opportunities for spoken fluency practise using QR codes are virtually endless – each code can contain a conversation prompt, which teachers can use as
short warmer or cooler activities, or as a means of staging longer conversational activities such as oral exam preparation.

**Filters and Layers**

Most of us are familiar with AR through the ubiquity of augmented reality filters, accessed for free on most mobile devices. Using similar technology, learners can take a picture of their classroom, and add tags and labels to various items for active vocabulary practice. Teachers can develop a virtual treasure hunt using similar apps, which the learners can follow from the comfort of their classroom, using their mobile devices to follow virtual clues set by the teacher, which are layered over photographs or videos of the local environment. These can also be used as prompts for conversation – as the learners move their camera over certain items in the room, or on the map, conversation questions can be activated.

**Virtual Flashcards**

Although this does take more advanced preparation than previously mentioned tasks and activities, it is now possible for teachers to create virtual flashcards, with built in AR triggers. Using similar technology to QR codes, teachers can use pre-designed templates for a range of lexical items. When students use their mobile devices to activate the flashcard a 3D likeness of the word is generated. Although this technology is in its early stages the majority of the content is being generated and shared by teachers, so it is likely that the volume of resources available will increase significantly over time.

**PROBLEMS AND LIMITATIONS**

Despite having great potential for increasing learner engagement with the task, and fostering autonomy (Bujak et al 2013), studies have shown that using AR in the classroom can have the opposite effect, with low engagement and low motivation from learners (Kerawalla et al 2006). This is potentially the result of the lack of teacher involvement permitted in many AR educational tools – teachers are unable to contribute to or adapt the content, and therefore cannot personalise it to the needs or preferences of their own learners.

The potential for distraction and decreased attention on non-technologically enhanced lessons is greatly increased when Augmented Reality tasks are introduced into the classroom, with learners sometimes becoming overwhelmed by the demands of manipulating the technology at the same time as trying to complete the task (Dunleavy 2009).

**FUTURE POTENTIAL**

As technology develops, and the availability of AR tools on mobile and handheld devices becomes more widespread, the opportunities for further integration of Augmented Reality into the language classroom can only increase. In the current educational context of students who are predominantly Digital Natives, the use of available technology in the classroom will surely become not only more common, but expected.
REFERENCES


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