International Journal of Virtual and Augmented Reality
Volume 6 • Issue 1

Bunker-Room Mnemonics for Second-Language Vocabulary Recall

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ABSTRACT

This paper presents a proposal and an initial prototype for a serious game (SG) aimed at helping second-language learners memorize a list of non-linked vocabulary items under a system of visuospatial bootstrapping. The usefulness of such a tool was suggested by the efficient outcomes of spatial mnemonics in TEFL providing 21st-century teachers, students, and game designers with new possibilities and it represents a new application of CALL. The game design is based on a modified version of Kalmpourtzis' AMSTP game design model, and it uses aesthetics, mechanics, story, technology, and pedagogy as its basis, adding the sixth element to its core: user expertise. The resulting AMSTP-UE framework allows in-game analysis from the point of view of a teacher, a learner, or a game designer. The game is a first-person walking simulator using the medium of virtual reality (VR) to provide its players with the feeling of presence in a virtual world. The prototype suggests using visuospatial information, deep learning APIs, and in-game data capture.

KEYWORDS

Computer-Assisted Language Learning, Serious Game, Virtual Reality, Visuospatial Bootstrapping, Vocabulary Recall

1. INTRODUCTION

The benefits for educators of technology-related competences have been pointed out by researchers on numerous occasions (Cunningham, 2000; Lam, 2000; Rakes & Casey, 2002; Baumann et al. 2008; Krumsvik, 2008; Comas-Quinn, 2011; Fullan & Langworthy, 2014, and Pettersson & Olofsson, 2019), even taking us back to the origins of Computer-Assisted Language Learning (CALL) in Second-Language Acquisition (SLA). The OECD 2030 paper defines these competences as key to meeting the challenges of a volatile, uncertain, complex, and ambiguous world, harnessing digital tools and artificial intelligence (European Council, 2018; OECD, 2018; Caena & Redecker, 2019). As noted by Chapelle (2003), CALL offers second-language learners the opportunity to receive enhanced input outside the classroom, but Kukulska Hulme (2005) argues that some of the devices available to learners are simply not designed for educational purposes, which makes it difficult for teachers to use them. It is important to mention that computers have changed the role of the teacher (Cunningham, 2000), the source of information now being information technology and the teacher being a facilitator of learning with the latter requiring from teachers not only technology-related

DOI: 10.4018/IJVAR.304899 *Corresponding Author

literacy such as computer-, information, multimedia-, and computer-mediated communication literacies (Berge, 1995; Warschauer, 2002, 2008;) but also aiming at blending both technology and content components (Mishra and Koehler, 2008; Chen, 2008; Chen, 2020). According to Li (2012) teachers are more likely than game designers to propose educational games that align pedagogical objectives, curriculum standards and students' needs because building an educational game is, in itself, a pedagogical process. As pointed out by Theodosiou and Karasavvidis (2015), if pedagogical experts want games to be more educational, they should get actively involved in their design themselves. This would, ideally, result in game designers and teachers combining their expertise and turning out games that are both entertaining and educationally efficient at the same time (Marne et al., 2012).

The motivational aspect of videogames applied for didactic purposes have been amply discussed by a number of authors (Prensky, 2001; Gee, 2003; Jenkins & Klopfer, 2003; Squire, 2003; Squire, 2005; Cheng & Su, 2012; Osma-Ruiz et al, 2015; Hartmann & Gommer, 2019). However, it is important to note that an effective game design considers both the intrinsic and extrinsic rewards for play (Dodlinger, 2007), with intrinsic motivation pushing players to act on their own behalf while extrinsic motivation pushes them to act through factors external to the activity (Denis & Jouvelot, 2005). It is essential to remember that players' experiences can be both frustrating and life-enhancing (Gee, 2003) and that the game generation has developed such cognitive approaches as active versus passive, playing versus working, fantasy versus reality, and pro-technology versus anti-technology (Prensky, 2001), which eventually affects the kind of teaching/learning strategies that should be offered to these learners both inside and outside the classroom. Bringing games into the real world for players has now become possible due to closer player integration with the game content via virtual, mixed and augmented realities which provide totally different experiences to digitally-minded generations in comparison to lectures or real-world practices (Bower& Jong, 2020).

2. DIDACTIC FOUNDATIONS

Originally appearing as a task-based procedure aligned with specific achievable goals, CALL gradually evolved into a multimedia-rich system and serious games environment, which offers a switch from in-class to out-of-class activities, and from teacher-guided to self-directed study. Based on graphics, visual effects, and supported by music, games can increase student engagement and enhance a teaching-learning process (Greitzer, Kuchar, & Huston, 2007, Neville, Shelton, & McInnis, 2009, Cobb & Horst, 2011, Thomas, 2011, Lu 2013, Di Zou, Huang & Xie, 2019). Play as a knowledge-acquiring activity, grounded on Bruner's (1974) and Vygotsky's (1978) research, has been fruitfully applied to starting up a serious-game movement (Sawyer & Rejeski, 2002) and its practicality has been highlighted in recent academic literature (Kahneman, 2011; Malaquias, Malaquias & Hwang, 2018, Jiang et al, 2019, Ouchaouka, 2020). The game Bunker-Rooms Mnemonics traces its roots back to a research report by Larchen Costuchen, Darling and Uytman (2020) which describes a framework supported by visuospatial bootstrapping (VSB), mobile-assisted language learning (MALL), and AR-enhanced flashcards. A total of sixty-two volunteers (N=62), all native Spanish speakers, participated in that study with a control group (n=31) dealing with digital flashcards on mobile phones and tablets trying to learn ten unknown idioms in English, with their corresponding translations into Spanish with a time restriction of 15 minutes. The experimental group was instructed to distribute QR codes with matrix barcodes prepared by the researcher around the students´ homes near to familiar objects; they then had to dedicate fifteen minutes to learning ten idioms by walking around their houses and scanning the quick-response codes through the Augment app with their mobile devices. The card scan activated augmented-reality models with idioms textually presented both in English and in Spanish, integrating them with the students´ habitual home environments. After the learning time, the students were asked to take an imaginary route through their houses recalling the idioms. Retention after the treatment in both the experimental and control groups was checked by a fifteen-minute-delay orthographic and translation test, adapted from a Nelson-Denny structure. A