

# LESSONS LEARNED ABOUT LANGUAGE LEARNING AND EXTENDED REALITY FRAMEWORKS

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## ABSTRACT

The knowledge of a second language is an obligation in educational systems of the European Community for many years and the quality of teaching and learning, especially in Italy, could be largely improved for a better outcome. Methods like Game-based Learning and Gamification could improve and change this outcome, combined with new tools used as educational technology in an immersive context. This paper presents some lessons learned from the adoption of VR / AR within two applications related to language learning. In this context, being immersed in an engaging and fun simulated situation is a good way to practice language conversations. In the last few years the great clamor of new VR / AR devices (HMD, controller, tracker) promotes the creation of new frameworks of extended reality for language learning.

Keywords: extended reality, educational technology, language learning, game-based learning

## 1. INTRODUCTION

In the context of Globalized World, the need for bilingualism/multilingualism is increasingly felt (Byram 1992; EduPlacements 2018). In 2004 the European Parliament and the Council promulgated the Directive 2004/38/EC on the right of citizens of the Union and their family members to move and reside freely within the territory of the Member States; as a consequence, in Italy the study of English as the second language became mandatory at any educational level (European Parliament 2004). Nevertheless, the recent statistics of EF-Italia about the level of knowledge of the English language places Italy at 34th place out of 88 countries in the world, and the European ranking reveals a 24th place out of 32 in the countries of Europe (EF Italia 2018). The major criticism that could be moved to Italian Educational system concerns a not optimal use of teaching methodology, with an excessive study of grammar compared to other competencies, like listening and dialogue. John Peter Sloan, actor and English teacher, answering the question about why Italians struggle so much with English said: "Because they don't have fun. Besides, a language is a puzzle and learning should be fun, just like practicing your favorite hobby. You should want to improve without struggling. Instead

in Italian classrooms fun is zero, using methods and courses that are not designed for Italians; everything is based on grammar and little on conversation. Not even the English know their grammar as much as the Italians" (Cosimi 2016).

Fun is strictly linked to motivation and motivation is an old issue of second language (L2) learning (Oxford and Shearin 1994; Noels, Pelletier, Clément and Vallerand 2000; Dörnyei, Henry and MacIntyr 2014). In this context the application of game mechanics is discussed in this paper with respect to the opportunities given by VR/AR in language learning. The notion of Extended reality (XR) is presented as a key point, useful to learning frameworks, especially where cross-situational learning methods (Smith and Smith 2012) and game-based situated learning (e.g. Second Life) (Iacono S. et al 2018) showed strong evidences in the educational literature of the last two decades.

## 2. MOTIVATION & GAME-BASED LEARNING

Motivation and fun have a strong correlation, because fun constructs engagement and engagement gave us motivation. The game designer Ralph Koster said: «Fun from games arises out of mastery. It arises out of comprehension. It is the act of solving puzzles that makes games fun. In other words, with games, learning is the drug» (Koster 2013). The "great power" of games can be conveyed in so many contexts and edutainment is only one of these (Deterding, Dixon, Khaled and Nacke 2011; Werbach and Hunter 2012; McGonigal 2011); this is the positive thrust that language learning might need. Computer Assisted Language Learning (CALL) has been largely used in education starting from early '80s (Chapelle 2001), and Mobile Assisted Language Learning (MALL) is now his natural evolution due to smartphones huge diffusion. Duolingo is a good example of gamified MALL that aims to give extra motivation to the learner with good results in self-study (Nushi and Egbali 2017), thanks to the intuitive and playful interface, the use of achievements and voice interaction. This app not only pushes the learner to translate, but also to repeat using voice, even if in short sentences. Is it possible to do more?

### 3. XR WORLD

#### 3.1. From Azuma to Present

In his survey Azuma (Azuma, 1996) describes all the potential of augmented reality as an advanced virtual reality. He identified some important areas of interest such as military, medical and manufacturing. If in these days augmented reality is still a great promise for the consumer market despite the fall of Google Glass (Bilton 2015) and now it is finally maturing, virtual reality is perceived as stable and ready to spread technology thanks to head mounted displays (HMD) like Oculus Rift and Htc Vive and PlayStation VR. (Martindale 2017).

#### 3.2. The role of Presence in VR

The most important factor in a virtual reality experience played with a HMD is the level of Presence, which is “*a psychological state or subjective perception in which even though part of all of an individual’s current experience is generated by and or filtered through human-made technology, part of all of the individual’s perception fails to accurately acknowledge the role of the technology in the experience*” (International Society for Presence Research 2000). Hardware such as controllers and HMD do the hardest work to create the illusion of being in another place, however the design of the experience is the final touch to avoid the presence break and motion sickness.

#### 3.3. The effectiveness of Virtual Reality

There is strong evidence on the effectiveness of virtual reality, thanks to Presence and the safe environment generated for simulation, appropriate to a training context. Researcher and Professional worker in different area observed stunning results. According to Narendra Kini, CEO at Miami Children’s Health System, the retention level a year after a VR training session “can be as much as 80% , compared to 20% retention after a week with traditional training, using Samsung Gear VR for procedures of cardiopulmonary resuscitation (CPR), nasal gastric tube insertion, Foley catheter insertion, intubation, starting an IV, wound care, and the Heimlich maneuver”. (Gaudiosi 2015). Mental illness can benefit of the use of virtual reality offering a safe place where the error is not something to fear and where the fear can be dominated. The Schizophrenia treatment with virtual reality produced significant improvement, some patients declare to have strongly improved their life quality. (Du Sert et al 2018). In the area of language learning, Lin and Lan (2015) investigated trends since 2004 to 2013 about virtual reality environments in four top ranked computer-assisted language learning journals (Lin and Lan 2015). In particular authors analyzed contexts as multiuser domains (MUDs), massive multiplayer online games (MOOGs) and synthetic immersive environments (SIEs). Nowadays these types of VR environments are so far from the “power of VR” through HMD, but they showed how a good use of VR simulation was already relevant for language learning, especially when virtual environments were experienced by people with special needs.

Another study (Hsu 2017) shows a high learning effectiveness from the adoption of augmented reality for language learning, regardless of the learning styles of the participants.

#### 3.4. Road to Extended Reality

Extended reality is now just a concept that complete the Milgram’s Reality-Virtuality continuum. This term describes different types and modes to interact with different virtual elements in the world. Currently it seems that for each phase of the continuum it is possible to use only one hardware solution, but this is not totally true. Most new-generation HMDs have at least two cameras, used to avoid the installation of an external tracking system. These cameras could be used simply as normal cameras turning an HMD VR – such as Vive Focus – into a sort of prototype for extended reality. Very far but similar in concept to what is presented by Qualcomm in his research paper: “a device to rule them all”.

### 4. PUT PIECES TOGETHER: MONDLY

As a research laboratory, we are currently experiencing the great potential of VR / AR that needs to be explored in more contexts, especially in learning. Our proposal is to find a way to address this potential in language learning. An application, a MALL called Mondly, has tried to follow this path, particularly in the VR and AR version. In the next part we analyze the two modalities of this app to understand if these two modes can have a significant impact in language learning.

#### 4.1. Mondly VR

Launched in 2017, this standalone application is available for Android and iOS using Samsung Gear VR, Google Cardboard and Daydream. It offers 28 different languages, which is a very significant language covering. The selection method can be natural using the voice or “point click” with default pointer typical of the mobile virtual reality app. When the language is selected the app shows a menu of four different learning situations; one of these has two sub-contexts:

1. Hello
2. Taxi
3. Hotel
  - a. Reception
  - b. Room
4. At the restaurant



Figure 1: Screenshot from the “Hello” context of Mondly VR

Each of these contexts represents a scripted typical conversation as described in the title. The system displays what the character in scene said and it suggests three possible answers with their relative translations. The player may choose to follow suggestions or say something coherent with the conversation. If the player says something “out of the loop”, the system simply replies that it has not understood and goes on stand-by until the correct and consistent flow of the conversation starts again. The computer graphics representation is very basic, and every experience lasts approximately 3-5 minutes.

#### 4.2. Mondly AR

This new version of Mondly was launched in 2018 and it is integrated into the basic app of Mondly. At every launch of the AR function is requested to make a short setup of the environment with smartphone’s camera. After a young woman character has appeared, a tutorial of the application starts showing various 3D animals and objects, describing some particularities of the represented concepts. During the tutorial the female character requests to repeat some brief names or sentences. Furthermore, if an object is stored in the 3D models database, the user can recall it "on stage", by pronouncing the related name.

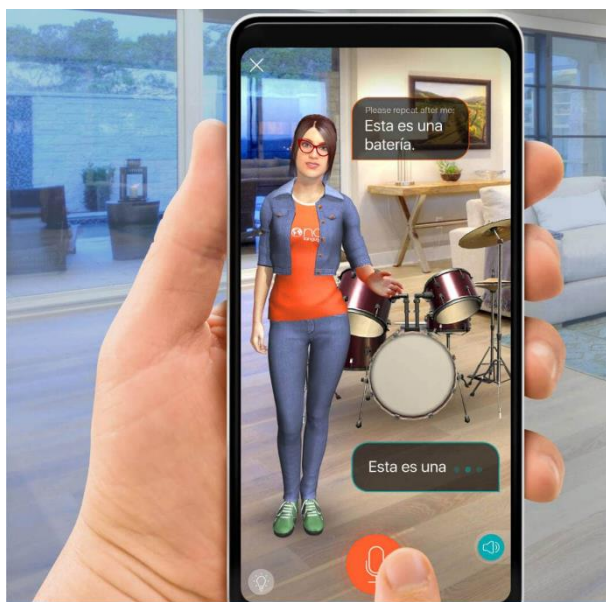


Figure 2: Snapshot from the Mondly AR add-on

#### 4.3. Mondly and Presence

To assess the level of presence, we are collecting volunteers to test the application and submitting to them the International Test Commission - Sense of Presence Inventory (ITC-SOPI) (Lessiter 2001). This standard is designed to measure:

1. Physical spatial presence referred to the sensation of being in a physical space in the mediated environment and having control over it;

2. Involvement referring to the tendency to feel psychologically and pleasantly involved in the virtual environment;
3. Ecological validity referred to the tendency to perceive the environment mediated as real;
4. Negative effects related to adverse psychological reactions.

The data collected are not yet statistically significant. At the moment all the people interviewed are males, aged between 20 and 34 or over 55 years. They had no problem related to VR sickness, such as nausea and headache; only in one case a mild eye fatigue was observed. There was a moderate success from the point of view of engagement and attention, with a peak in the subjects that had never experienced virtual reality through an HMD.

#### 5. CONCLUSIONS

The Mondly VR app looks more solid than the Augmented Reality add-on. However, both Mondly VR and Mondly AR share a significant flaw: the characters have unnatural voices. In general, conversational systems need a robust speech recognition and understanding tools. AR/VR based application without a good conversational user interface are less effective and show a dramatic lower level of presence. In the current version of Mondly the conversational interface is very poor, and it ruins the presence that is already weakened by 3D low quality models. If poor models are pardonable for compatibility reasons of the app, this is less forgivable in the AR app, where the 3d showed objects are very few. On the contrary, the AR app is more convincing with respect to cross-situational learning scenarios than the VR one. The learning context seems really engaging and it takes advantage of the stunning effect of AR and VR, but it’s obvious that the “wow effect” is ephemeral. This app or any other application that aims to improve the language learning needs also to experiment the potential of the tool, not only to create a basic context but an engaging context with a larger structure and narrative. Pokémon GO (2016) is still the Killer App of augmented reality, since it is simple, funny and georeferenced; it merges contexts creating a fusion between the real world and a fascinating virtual world. Can a Pokémon GO-like app be productive? We know that game-based learning is potentially effective, and this could overcome some of the current flaws of Mondly. From now on, in order to improve the immersive experience, it appears crucial the adoption of totally standalone devices (such as Oculus Quest and Vive Focus) to design better immersive XR applications.

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