Language Learning Pedagogical Affordances of the Metaverse

Cristina Obae
cristina.obae@tuni.fi
MEL, TAMK, Tampere, Finland

Amany Alkhayat
amanyudemy@gmail.com
Columbia University
USA

Abstract: This article aims to discuss the use of the metaverse, a 3D virtual space created by the interconnectedness of the physical and digital realms, for teaching language learning. The authors discuss the affordances and constraints of having a social virtual reality learning environment for language education, offering examples from English as a Second Language and French as foreign language classes. The article notes that the technology is adaptable to any language curriculum, and its use ultimately depends on the creativity and technology literacy of the teacher.

Introduction

"The metaverse is a shared online space that incorporates 3D graphics, either on a screen or in virtual reality." (Sparkes, 2021) The term has gained a lot of buzz recently. However, it is important to note that the concept of "metaverse" is not new. It was first coined by science fiction author Neal Stephenson in his 1992 novel Snow Crash, where he described a virtual world that was created by the convergence of the physical and digital realms.

Neal Stephenson's novel inspired many researchers to write about suggesting a course on Virtual Reality and education (McLellan , 1994), building a metaverse (Flower, 1995; Budiansky, 1995), creating tools and protocols for the metaverse (Parr, & Rohaly, 1995, January), designing virtual reality (Dickey,1999), and avatars and embodied agents in virtual environments (Nijholt, 2000, December).

Then there were extensive research projects that were conducted in Second life and also encompassed the use of AI especially from Monash University in language learning, creating NPCs for language learners using AIML, the Artificial Intelligence Markup Language, where NPCs, aka chatbots, provide learners with certain scenarios in specific situations that activate certain actions in-world to create a playable, memorable, learnable experiences (Grant, Huang, & Pasfield-Neofitou, 2013; Pasfield-Neofitou, Huang, & Grant, 2015; Pasfield-Neofitou, Grant, & Huang, 2016).

Second Life wasn't only used for second language learning, but research showed its potential as a powerful learning tool for K-12 or higher education (Inman, Wright, & Hartman, 2010; Boulos, Hetherington, & Wheeler, 2007, Warburton, 2009). So, the metaverse started to be looked at as a potential learning environment both by researchers and teachers.

A learning environment means different things to different people. Some would think of a classroom, others would think of the technology that could enable learning, providing an environment "in which students feel inspired, safe and supported to get knowledge". (*3 Types*

of Learning Environments, n.d.) An increased number of educational institutions are taking steps further in including the use of the metaverse technologies in their teaching strategies. MsGivney from Harvard University explained that: ‘’Half the battle is getting students to care about what you’re trying to teach, so VR, because of the way it situates someone in the environment and the power it can provide for storytelling, it gives someone an emotional experience, which really connects to student excitement and investment’’. (*What Will Learning in the Metaverse Look Like?*, n.d.)

When thinking of the different spaces that schools and universities work hard to provide, an engaging environment is one of the main targets educators want to achieve. Teachers want to find better ways to have their students motivated and engaged with the content. To illustrate, the metaverse environment, as described by Erickson, gives the opportunity to build special spaces for students to interact and share experiences in a better and more engaging way (*Metaverse Education*, 2022).

Practical and Theoretical Approaches

The experiments presented in the current paper were all based on different theoretical approaches of teaching such as experiential learning, constructivism, scenario-based learning (see Table 1 below). Students accessed the VR learning environments from both VR headsets and computers.

Table 1. Types of theoretical approaches used during each experiment

Experiment	Approach
1- ESL Role play activities and reflection using IFXs	scenario-based
2- ESL Co-creation with peers	constructivism
3- ESL Storytelling	experiential learning
4- FFL Pronunciation	scenario-based & experiential learning
5- FFL Present tense exhibition	constructivism
6- FFL Reading comprehension	experiential learning

“A common usage of the term “experiential learning” defines it as a particular form of learning from life experience; often contrasted with lecture and classroom learning” (Kolb, 1984). It is a in-context experience where the learner is confronted with real-life situations going through the stages of experiencing, reflecting, thinking, and acting as illustrated below:

Figure 1. Kolb's learning cycle ('What Is Experiential Learning?', n.d.)

Using the notion of experiential learning in designing courses for second language learners, we can allow students to engage their senses and create a sense of presence or immersion.

VR allows real-life simulations and construction of scenarios that put the student in such experiential situations. The technology gives opportunity for customization of the experiences, altering the scene, the time, the place, the persons learners encounter, offering an enhanced yet controlled reality where social interaction and discovery are possible.

Constructivism places a strong emphasis on how to enhance student knowledge creation to improve learning effectiveness. Learning in virtual reality frequently involves the freedom to fail. Students can investigate and evaluate their responses using VR, as well as discover the natural links between concepts and established cause-and-effect relationships that they can comprehend and absorb. Constructivist approaches, according to research, underlie our understanding of learning in virtual reality. since it entails learners exploring and discovering virtual settings, as well as educators and instructional designers matching these virtual worlds to learning objectives.

By immersing a learner in a realistic simulation, VR experiences are a potent tool to model systems. This modality can, therefore, considerably enhance situated cognition. Students use contextual learning strategies to treat a VR environment as though it were the actual world (Chittaro & Ranon, 2007). VR learning environments have been developed and employed in a range of contexts and fields, including language learning and medical education (Brenton et al., 2007; Shih & Yang, 2008), therefore, VR, with immersion or simulation capabilities, may create experiences that are taking to Dewey and Vygotsky's situated learning (Clancey, 1995) while also offering a high level of realism and involvement.

In the field of second language learning, VR has many pedagogical uses. For example, they can be used for storytelling, allowing learners to experience stories in a vivid and engaging way. They can also be used for role play, allowing learners to practice using the language in a variety of realistic contexts. Ferguson et al., (2020) found that interactive storytelling experiences in VR allows users to "navigate freely through the game and has positive effects on presence and cognitive interest." (p. 9)

In addition, VR can be used for scenario-based learning, where learners are placed in realistic scenarios and asked to use the language to accomplish specific tasks. In a pilot study conducted to investigate the effect of VR on second language learners' emotions using a scenario-based learning approach (Plutino et. al., 2020), researchers found that scenario-based learning

provides “useful skills for students to explore before going on their year abroad or work in a different country” (p. 25).

Practical examples

As practical examples to illustrate affordances of metaverse usage into education, we chose six learning experiences for language teaching in Engage that the authors of this paper created and experimented with: three designed for English as a second language (ESL) students and three for French as a foreign language (FFL).

1- ESL Role play activities and reflections using IFXs

Objective: Practicing past simple and past perfect tenses
Audience: Intermediate
Duration: 20 minutes

ESL Textbooks are abundant with many role play examples, however, when it comes to practicing in the physical classroom or via web conferencing tools, it’s always hard for students to engage in the activity. There’s a lot of potential in such role play activities in VR where students are put in a situation similar to a scavenger hunt where they have to find objects, investigate and ask questions to peers and write reports about the results in the end. Figure 2 shows a scene during an event, hosted by Educators in VR, that was built in Engage to train educators to use roleplay activities in VR. The scene included an NPC that was used as a victim, and several 3D objects were scattered around and hidden in the office. Students are supposed to take the role of either the suspect or the police officer. Students learn crime vocabulary like *alibi, jail, innocent, guilty* etc. They also practice differences between past perfect and past simple. Additionally, they practice employing these tenses in interrogatives, affirmative, and negative statements. During the event, attendees described examples of how this crime scene could meet learning outcomes and improve learners’ proficiency levels by being immersed in an activity that incorporates scenario-based learning that mimic real life situations.Moreover, attendees discussed how this scene can be used where students can be tasked to solve a mystery and collect evidence, and interviewing witnesses using the vocabulary and structure they learned in a fun and meaningful learning experience.

Figure 2. Teachers were asked to role play in this immersive experience built in VR during a training session held by the Educators in VR Vlanguages team where the co-author created a crime scene in Engage

2- ESL Co-creation with peers

Objective: Practicing idioms through co-creation
Audience: intermediate to advanced
Duration: 20 mins

It's usually difficult for ESL students to grasp the idea behind idioms and expressions. As the most important aspect of virtual reality is presence through engagement and manipulation, teachers can engage students through clear instructions in which students can compete to use Immersive Effects (IFXs) to convey the meaning of an idiom. Then, they share it with other students and challenge them to identify the meaning of the idiom being presented. Teachers can choose a number of idioms and ask the students to pair up or work in groups. Each group is assigned an idiom and they have to think of ways to use the IFXs to create artifacts that symbolize the idiom. IFXs are not only 3D objects; they can also be sound effects, rain, thunder, fire and other effects that can be added to the VR environment. Each group of students showcase their creations and other groups have to guess the idiom. This creates a sense of competition and excitement. Humor and wonder also become salient in such situations when the students come up with different guesses until they guess the right idiom. In addition, this activity helps students understand spatial technology and how creating objects and positioning oneself in VR can differ from one person to another. For example, Figure 3 shows how students created a 3D model for the idiom *It's raining cats and dogs* which was clear and funny.

Figure 3. Illustrating idiom *It's raining cats and dogs*

Whereas in Figure 4, it took most teams sometime to figure out the meaning of the idiom, *Pulling someone's legs,* as they were facing the idiom from the wrong direction and didn't see the dinosaur's foot that was pulled.

Figure 4. Illustrating idiom *pull someone's legs*3- ESL Storytelling

3- VR Storytelling

Objective: Practicing present simple and descriptive writing
Audience: intermediate
Duration: 30 min

Storytelling is a tool that immerses students with elements like character, plot, themes, and setting. Visualizing events, emotions in the story can make learning more engaging. Engage platform enables users to create snapshots where they can design their own environment or add to it and save it so that they can retrieve it and spawn it anywhere. In order to engage students, public domain stories are abundant with famous novels and plays that can be a starting point for students to create their own immersive stories. Students can also create different parts of the story across different environments. For instance, ESL students helped the second author construct the VR experience Gulliver's Voyage to Brobdingnag, where the students selected several VR settings to recreate the story. In Engage, three settings were selected. To represent the portion of the story where Gulliver was traveling, the first one was a virtual world that included a ship. The students chose a setting in which the Giants intended to enslave Gulliver. Finally, in the final VR world, the students planned to demonstrate Gulliver's attempt to escape. Creating such an immersive experience was not easy at the very beginning. The first challenge was choosing worlds that relate to the story. The students explored different worlds in Engage. They were required to write some justifications to explain why these specific worlds were chosen for the experience. This encourages students to apply critical thinking skills and reasoning. The second challenge was choosing the character that will perform the role of Gulliver. At first, the students discussed having one of them to do the role of Gulliver; however, it turned out that in Engage, users can't change the height of the avatar below 150 centimeters. So students decided to use NPCs to solve the problem instead. They also minimized Gulliver's NPC to align with the narrative. Such discussions among students allow for negotiation of meaning in the target language and enhance problem solving skills. Finally, students were able to create an immersive experience, practice the target language, solve problems and negotiate meaning.

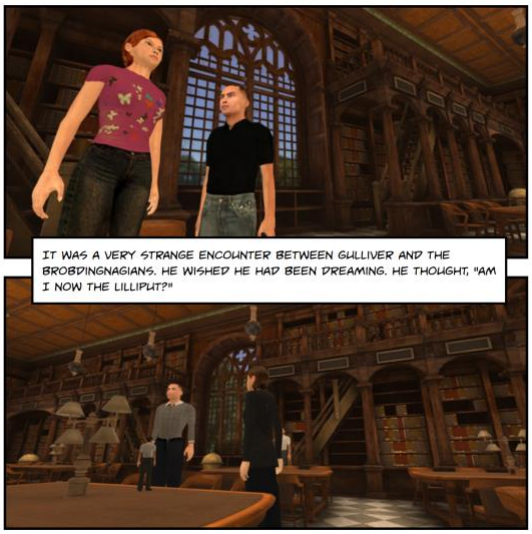

Figure 5. Gulliver's Voyage to Brobdingnag in Engage VR recreated as a story for BookCreator

4- FFL Pronunciation

Objective: learning the pronunciation rules for the French digrammes & trigrammes
Audience: High School students, beginner (A1)
Duration: 60 min

The learning goals of this experience are acquiring new information concerning the French digrammes and trigrams (see Fig. 6). Invited in the 3D Personalized tropical island (see figure 5), students are immersed in a scenario-based project. The instructions are presented as a problem learners need to solve: Animals escaped from a shipwreck and got to the island. In order for the rescuers to be able to catch them, they need to write each animal's name in French on a post-it, then organize them in categories depending on the groups of letters pronounced as one sound which are to be found in their French name. Each group of animals will go into a specific cage. You need to figure out which cage to put each animal in and glue the post-it to that cage.

Figure 6. VR learning environment for learning French pronunciation rules

All the stages of Kolb's experiential learning cycle (see figure 1) are present in the learning experience and Engage affordances supports the process: students **experiment** through exploring the island, discovering different animals, using online dictionary for finding their names' pronunciation, **reflecting** through reading out loud, **thinking** and working together to discover the commonalities and negotiating the division into categories, then finally

acting by writing the names of the animals on post-its and gluing them on the cages. Going through all these steps, they manage to uncover, without even realizing it, the essential pronunciation rules of the French language.

Learners enjoyed the activity and referenced back to the “cages” several weeks after the respective class.

5- FFL Present tense exhibition

Objective: consolidate the French 1st group verbs present tense conjugation
Audience: High School students, beginner (A1)
Duration: 60 min

For this task, students worked on consolidating the French 1st group verbs conjugation in the present tense. Having previously had a lesson on discovering the conjugation rules and the three groups of verbs in French, they went back to the Engage exhibition hall-day (Fig. 7) and using virtual post-its, they conjugated, in groups, new verbs. Each student was responsible for a part of the verb and the teams had a contest combining subject + root+ ending. World exploration was combined, thanks to the metaverse affordances, with co-building and gamification, helping learners to stabilize an essential French grammar rules.

As the facilitator observed VR environment allows transposition of real life hands-on activities in an online context which wouldn’t be otherwise possible if using a 2D conferencing tool such as Zoom, Meet or Teams.

Figure 7. 1st group French verbs conjugation activity in VR learning environment

6- FFL Reading comprehension

Objective: improving reading comprehension skills in French
Audience: High School students, beginner (A1)
Duration: 60 min

This task converted a classical individual reading comprehension assessment into an exploratory VR experience (Fig. 8). The learning goal for the beginner students was to read a short story in French, discover its meaning by exploring the VR learning environment, then create a new story and illustrate it. Storytelling and exploration of the VR environment were all combined in a personalized Creator Grass Space. Using post-its, whiteboards, online dictionaries and IFXs students were able to understand a new text, orally answer comprehension questions and write their very first sentences in French. Experiential learning was once more put into action. As the figure 8 exemplifies it, the VR transposition

of the initial story was transformed into a student's own creation, the learning environment affordances allowing for keeping track of the learner's writing process.

As the facilitator observed, this type of reading comprehension didn't add any pressure on the students. They were extremely relaxed and didn't have the usual blockage of beginners language learners when confronted with new words. The effort of understanding by combining visual and textual cues came in a very natural way.

Original story illustrated in VR

Student created story illustrated in VR

Figure 8. Story illustration and writing in a VR learning environment

Conclusion

In conclusion, the metaverse, through the virtual reality platforms, offer many exciting possibilities for language learning. By the immersive and engaging environments students can be exposed to authentic language input and can practice in realistic contexts. This can be particularly effective for pronunciation, grammatical structures and vocabulary acquisition.

Additionally, such platforms can support storytelling, role play, experiential learning, co-building and gamification being suited for beginners and advanced learners, for introducing new knowledge, reinforcing or assessing it. These approaches emphasize the importance of communication and interaction and support learners develop their language skills.

In this learning environment different pedagogies can be used, activities transformed, and human ingenuity taken to new heights. But, in the end, we need to keep in mind that the metaverse is only a technology. What matters and adds value is what creative people do with it.

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