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Metaverse biomes with Design Thinking for TESOL and exponential language acquisition

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Περίληψη

Η παρούσα εργασία αξιολογεί την αποτελεσματικότητα της χρήσης βιοσυνόλων στο μετασύμπαν για τη διευκόλυνση της Διδασκαλίας Αγγλικών, κι ευαισθητοποιεί για την ανάδειξή τους στην τάξη που αποδέχεται τη νέα εποχή. Επισημαίνει τη διαδικασία με την οποία μπορεί να εμπλουτίσει την εμπειρία εκμάθησης της γλώσσας για επιταχυνόμενη κατάκτηση και χαμηλό συγκινησιακό φίλτρο (Κράσεν) σε μια προσέγγιση Σχεδιαστικής Σκέψης τεσσάρων βημάτων που εξελίσσονται γύρω από την παρατήρηση, συμπόνια, δημιουργικότητα και κριτική σκέψη. Παρόλη την περιορισμένη βιβλιογραφία στην Εμβυθιστική Σχεδιαστική Σκέψη, μέσω της μελέτης περίπτωσης πάνω στη χρήση του μετασύμπαντος σε σύγχρονα διαδικτυακά προγράμματα διδασκαλίας Ενηλίκων και με δημοσκοπήσεις τμημάτων, η εργασία αποκαλύπτει τα ωφέλη της διδασκαλίας μέσω γλωσσικής εμβύθισης. Εμβαπτίζοντας του μαθητές σε προσομοιώσεις, machinima, Τέχνη Τεχνητής Νοημοσύνης και διάδραση που χτίζονται σε Εικονική Πραγματικότητα και Εικονικούς Κόσμους, ο διδάσκων περνά σε εξεύρεση λύσεων μέσα από βήματα Σχεδιαστικής Σκέψης με ανθρωποκεντρική δραστηριότητα. Τα συμπεράσματα χρησιμεύουν σε σχεδιαστές προγραμμάτων και σε διδάσκοντες, διεπιστημονικά.

Λέξεις κλειδιά: Μετασύμπαν, Σχεδιαστική Σκέψη, Εμβύθιση, VR/VWs/A.I., TESOL.

Abstract

This paper evaluates the efficiency of using metaverse biomes to facilitate Teaching English to Speakers of Other Languages, and raises awareness of their emergence in the English language classroom embracing the new era. Through a case study, it highlights the process in which language-learning experience can enhance accelerated acquisition and low affective filter (Krashen, 1988) in a four-step *Design Thinking* approach evolving around observation, compassion, creativity and critical thinking. Despite limited existing bibliography in *Immersive Design Thinking*, through a case study of using the metaverse on contemporary online courses with an Adult Educational Institution, and through class surveys, the

paper reveals the benefits of immersion in language teaching. By immersing learners in simulations, machinima creation, A.I. and interactivity built in biomes in Virtual Reality and Virtual Worlds, the teacher goes through steps of human-centric and solutions-based *Design Thinking* activity. The conclusions are useful for curriculum designers and teaching professionals, interdisciplinarily.

Keywords: Metaverse, Design Thinking, Immersion, VR/VWs/A.I., TESOL.

1. Introduction

"*Immersive learning experiences are becoming more and more prevalent with each passing year, so it's important to understand and adhere to design best practices for the betterment of ourselves, our audiences, and ultimately our stakeholders.*" (Henry, 2023).

Restricted by situational and dispositional barriers, young and adult learners in particular can easily lose interest in learning, especially so when they are affected by previously held assumption based on negative past experiences. Within the process of perspective transformation, the adult learner makes the uncomfortable recognition that their current experience does not match their past knowledge and attitude (Mezirow, 2000, p. 22). In VR/VW/AI environments, starting with a disorienting dilemma and self-examination, the TESOL learner in the metaverse can critically assess and recognise the shared experiences and explores alternative ways of being and living as evidenced in Second Life by Gregory (2012) and Sadler (2012). With or without the required technology on their desktop, the majority of the adult learners in question appear to be more eager to explore options for new behaviour, to plan a course of action to acquire new knowledge and try new roles, which builds more confidence and reintegration, even through the use of machinima (Galani, 2015), screen-sharing of the Virtual environment and through carefully designed activity in-world. As indicated in the following sections, the use of VR, AI and VWs in the contemporary language classroom comes to motivate the adult learner to understand their own learning needs, to take initiative towards overcoming past preconceptions, and to seek new adequate andragogical processes that meet these learning needs in the ever developing society and workplace.

To cater for these learning needs, the educator assumes the additional role of course designer to help their students employ a new transformed perspective and re-integrate into their lives. Building a less linear, more flexible and faster-paced contemporary online course, away from the traditional ADDIE model, makes design more concerned with the learning environments

(Wasson & Kirschner in Ní Shé et al., 2022). In the metaverse, this may have its challenges but it also involves a lot of meaningful decision-making together with freedom of movement, solidarity, innovation and creativity, as explained in Sections 2 and 3. According to Ní Shé et al. (2022), *Design Thinking* can be used in the development of instructional material, thus creating more authentic and empathetic learning experiences.

1.2. Purpose

This paper seeks to add to the limited research available where curriculum is delivered through cost-effective VR/VWs/A.I. learning experiences through a *Design Thinking* integrative approach in simulated teacher/learner-created, immersive environments in the metaverse. Also it can inform the existing research by presenting engaging adult learning experiences in live, synchronous, online, blended TESOL courses.

1.3. Method and tools

The paper is based on a case study of using Virtual Reality, Virtual Worlds and Artificial Intelligence, primarily with online adult TESOL classes with from 2021 until 2023. First, it highlights the virtual environments employed and provides a rationale for the immersive outcomes. Subsequently, after consideration of possible limitations, it outlines the model of *Design Thinking*, its processes, applications and task types implemented. The paper further suggests that metaverse technologies can be used in educational settings by taking full advantage of their much-promising affordances (Mulders et al., 2020).

The online application 'Survey Planet' was used as the main tool to gather data concerning the learners' reactions, feedback and outcomes. The foci groups' by-products themselves, illustrated as Figures in the paper or as links to online VR and VW destinations, also stand as evidence of learner engagement and fulfillment of teaching objectives. During the teaching process, the course learning aims, content and delivery mechanisms were diagnosed and defined through games, role plays, simulations and questionnaires. Since 2021, the following course topics were identified by the foci groups through projects around the metaverse, indicatively: UN Sustainability Goals, immersive Tourism, travel and accidents, local history and culture, A.I. generated Art, integrating character engine, eating out, socialising and shopping (Galani, 3/2023). The online groups in the case study consisted of mixed-gender, mixed-ability adult learners of English as a Second Language, numbering from twelve to fifteen learners each. To

organise the learning process and provide both synchronous and asynchronous opportunities for learning, Canvas Instructor was used as a Learning Management System, together with Google documents, the educator's You Tube channel, and Zoom for the live classes.

1.4. Metaverse destinations

For the purposes of this study, the metaverse biomes that were used were selected in order to provide free and safe open access to the course participants (Figure 1). With the exception of Kitely, OpenSim and Second Life, the learner gains access to the Virtual environments through a single click of a hyperlink on the browser of their computer or mobile phone. FrameVR, Mozilla Hubs and Spatial.io together with inworld.ai, DALL.E, Open A.I. and Playgroundai systems that can create realistic images and art were all used for a blended, flipped, a/synchronous, hybrid and immersive approach to learning.

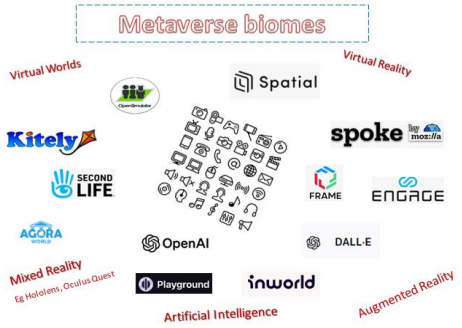

Figure 1: Immersive Learning Environments

2. Rationale and Bibliography

2.1.1. Immersion for Comprehensible input

The author's rationale behind the selection of the afore-mentioned metaverse destinations in TESOL is manifold. First of all, although these are new environments to the adult learner, they constitute a non-threatening area which reduces anxiety by lowering the affective filter (Access to Virtual and Action Learning Live Online, 2010; Lan et. al, 2013). These biomes provide comprehensible input in the target language, as Krashen describes it in his input hypothesis theory for language acquisition (1988), and can be used for meaningful interaction and natural communication, without constant correction necessarily. To facilitate the learning process, for lessons in the

metaverse, the instructional designer takes decisions around a general perspective to cater for emotional, physical, social, artistic, creative, ecological and spiritual potentials as Miller (1997) describes the holistic approach to education. Through stress-free and playful simulations, useful field trips and gamified activity (Gibson, 2014), the participant leverages the affordances of the virtual environments. Focus is shifted on production, interaction and simple task completion (Ellis, 2003) rather than on behavioural drilling and extensive grammar rules. Besides, VR affordances such as immersive presence and embodiment can provide learners with rich simulated contexts in which to create meaning through interaction and participation (Chun et al., 2022). Overall, the suggested metaverse destinations can be a flexible and accessible environment in English for the process of materials design along the lines of *Design Thinking*.

In their research involving three immersive VR groups targeting 'languaculture learning' (one performing kinaesthetic actions, a non-kinaesthetic one and a text-only group), Vázquez et al. (in Chun et al., 2022, p. 136) highlight that "*the virtual kinesthetic group had significantly higher vocabulary retention rates of 20 transitive verbs in Spanish after a week of exposure compared to the other two conditions*." Additionally, the kinaesthetic VR learners' higher performance over the non-kinaesthetic group, who did not perform but only viewed gestures, "*indicates that meaningful embodied actions confer a benefit over immersive presence per se when encoding vocabulary with gestures."*(ibid). The same article emphasises that interacting with a virtual avatar was both realistic and engaging while there was a positive correlation between the number of times a word-action pair was executed with bodily movement and the number of times the learner remembered a word in simulations resembling real-world activity such as tourist travel scenarios. Amongst similar examples forming the basis of empirical research, a further study in the same publication (ibid) involved two groups of adolescent English as a foreign language (EFL) learners in Taiwan, a group of VR players who interacted with the Mondly app and a group of VR watchers who only watched a pre-recorded video on a computer without interacting with the virtual characters. The former group's "*learning and retention in vocabulary tests were significantly higher than those of the video watchers"*.

2.1.2. Considerations

Understandably, there are certain practical conditions that may hinder the success of these lessons such as the selection of appropriate technology, and pre-registering an account online. Virtual reality can have a steep learning curve for both students and teachers. This is a focal point to consider while making decisions during the design process, and requires a profound understanding of the environments and the factors appreciating individual perceptions (Mulders, 2020). To this end, for starters, the use of FrameVR.io, Spatial.io, Mozilla Hubs, DALL.e, inworld.ai and playgroundai tends to be intuitive and does not necessarily require registration.

It may sound daunting, at first, but it is worth pointing out that a good number of our learners, especially the younger ones, are already familiar with mental and physical immersive technologies that create personal experiences in cyberspace (Gibson in Sadler, 2012 and Chun et al., 2022). Hence, immersive environments can offer learners rich and complex content-based learning, interaction and imagination, while also helping improve their technical, creative, and problem-solving skills (Mulders, 2020). Besides, to guide immersive learning and to decrease the cognitive load (ibid), leaving instructions on the class Learning Management System with images and machinima/videos for preparation on how these metaverse destinations can best be accessed reduces the stress caused by technology and helps overcome feelings of self-doubt with its use, to build confidence and exposure to the target language. One might also question their own ability to use such technologically dense spaces. These biomes provide such hyper-realistic content engagement that language educators may fear that, without training, they are incapable of avoiding pitfalls in class, as was initially the case in Second Life (Sadler, 2012). Although, to a certain extent, the claim may hold true for Second Life and Open Sim, this is not an insurmountable obstacle to overcome, given that self-exploration in a gamified environment is part of our daily life, especially so when there is clear understanding of why this type of telecollaboration is relevant for individuals who wish to improve their language skills (ibid). Lack of training on design thinking in education could also contribute to the problem of educators thinking less creatively and innovatively to enhance the learning experience, which may lead to fewer students being interested (Panke, 2020), and may have an adverse effect on learner performance.

Mostly drawing from the Cognitive Theory of Multimedia Design, Dodds (2023) points out that there may be a lack of registered research addressing how known instructional design criteria and principles are applicable to the metaverse. Nevertheless, the decisions for design that need to be made are not based on the technology itself but on the learner needs and their purpose for learning in an adaptable framework.

2.2. Design Thinking

In his book for creative leaders seeking to infuse design thinking into every level, Tim Brown (2009) states that "*Design thinking is neither art nor science nor religion. It is the capacity, ultimately, for integrative thinking*." Designer and author Robert Peters (2019) supports that regardless of the field, "*design creates culture. Culture shapes values. Values determine the future*". Roger Martin (2013) purports that "*Design isn't just about making things beautiful; it is also about making things work beautifully*." This is a new approach to innovation that challenges conventional ways of thinking and doing by focusing on creativity and collaboration. Global leaders such as AirBnB, Apple, Bank of America, Google, IBM, Nike, and Uber have all adopted design thinking. Thought leaders in this field have shifted the focus from professional design thinkers to anyone getting inspired and learning from the way professional designers think and apply this observation to their own practice. With its origins in architecture, design and art, *Design Thinking* was later on also applicable in the field of management (Johansson & Woodilla, 2009). The Harvard Graduate School of Education promote the idea that *Design Thinking* is a mind-set and an approach to learning, problem-solving and collaboration encouraging the learner to develop an inquiry stance, to think divergently and reflectively (Brown, 2008).

2.2.1. Instructional Design Models

A lot of models have developed to cater for the needs of the classroom, such as for instance the ADDIE Model (Analyse, Design, Develop, Implement, and Evaluate), SAM's Model, Backward design (Stapleton-Corcoran, 2023), Merrill's Principles of Instruction, Gagne's Nine Events of Instruction, Bloom's Taxonomy, Dick and Carey Model, Kemp Design Model, Action Mapping by Cathy Moore, Fink's Model, Arc's Model and Kirkpatrick to name but a few. Design thinking is used in any domain and offers a creative problem solving process to understand users, challenge assumptions, redefine problems in order to develop innovative, user-centric services and solutions (adapted from Interaction Design Foundation, 2016). Past research

implementing Virtual environments has also provided significant insights into Immersive language teaching by European Union Research Projects such as *AVALON* (Access to Virtual and Action learning Live ONLine, 2009-2011), *GUINEVERE* (Games Used IN Engaging Virtual Environments for Real-time language Education, 2017-2019), and *CAMELOT* (CreAting Machinima Empowers Live Online language Teaching and Learning, 2013-2015).

2.2.2. Why Design thinking?

Design thinking in education, referred to as D.T. from now on, is perceived as "*a model for enhancing creativity, endurance, engagement and innovation*" (Dolak et. al, 2013, p2). This model is more user-centred, iterative and reflective, prioritising learner experience and interaction (Ní Shé et al, 2022). It is an ideal learning cycle which comprises the following four stages: Experiencing, Reflecting, Thinking and Acting, which the learner goes through as a result of the D.T. process (Beckman, & Barry, 2007). The iterative proceeding process in *Design Thinking* can be associated with Kolb's experiential learning theory (Kolb, 1984; Rauth, et.al, 2010, in Luka, 2014).

The strong points it brings to education are its holistic, human-centric and systematic non-linear and flexible process (Luka, ibid), as opposed to other *Instructional Design* approaches. It is based on understanding and empathising with the learner to help address rapid change for exponential acquisition and intrinsic motivation. Its instructional goals are more about the design process than about the finished product while it is solutions-based focusing on more than one answer (ibid.). Therefore, D.T. for learning in the metaverse evolves around observation, compassion, innovative creativity and critical thinking by providing valuable learning experiences together with opportunities for motivational and memorable collaborative learning. Both design thinking and human-centred design are user-centred approaches to problem solving that focus on understanding the needs of the learner. D.T. is more focused on developing innovative solutions that meet the unmet needs of the participant while human-centric design is more focused on improving existing products and services. D.T. is based on the idea of Integrative Thinking (Figure 2) as it balances amongst the human desirability, business viability and technical feasibility with a sweet spot of innovation (Martin, 2009 a & b).

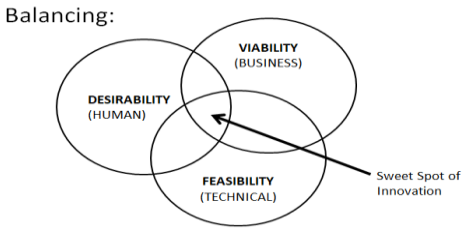

Figure 2: Martin, 2009a & b. Integrative Thinking

2.3. The Process of Design Thinking

From passive, one-size-fits-all approaches to a versatile four-step *Design thinking* approach, the course designer *observes*, *empathises*, *immerses* and *iterates*. After identifying the problems and discovering learner needs, the teacher or learner together create solutions in VR, VWs and AI through simulations, material and tasks. The solutions are applied and tested before being evaluated based on reflections and feedback. Outcomes are observed and the process is reformulated and revisited in a non-linear order. "*Design thinking skills can be developed in various activities at school, especially in group work and projects as one of the preconditions is team working and open communication*" (Luka, 2014). The process is an "integrative cycle" with repetition of the activity in loops (ibid). Ray (2012) observes the following six steps on this process: 1) identifying opportunity, 2) designing, 3) prototyping, 4) getting feedback, 5) scaling and spreading and 6) presenting. Han (2022) of the Harvard Business School supports a more simplified process of four stages of D.T., namely Clarifying, Ideating, Developing and Implementing. Figure 3 summarises these phases and illustrates the iterative class activity of the whole process continually implementing the integral steps of Observation and Empathy.

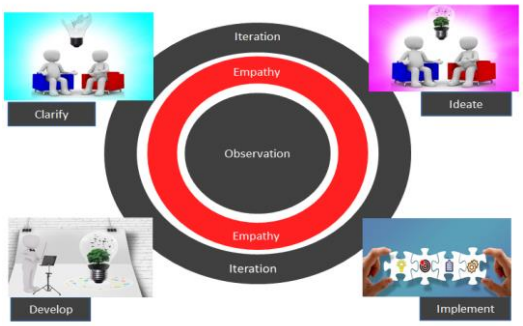

Figure 3: Design Thinking process (Adapted from Hann and Luka)

2.3.1. Clarifying through observation in the metaverse

Based on Han's observations, this initial vital stage involves making concrete observations about learner needs and wants, through the use of questionnaires, surveys, the Learning Management System, interviews, games and any possible means available. It can take place as a frontal activity in class, individually or as group work. The next step involves the designer-educator observing the system the learners are in, namely, the district, social positioning, workplace-school, spaces, culture or ethnographic approach (Gresalfi & Neal in Bruff, 2018). By revisiting this first stage and reframing the problems, the designer gains insight on deeper learner needs and spots outliers. Looking from a different perspective is essential in order to challenge assumptions and empathise with the learner.

2.3.2. Ideating through empathy

The insight gained through observation in the previous stage is used to brainstorm solutions for positive results, to identify design principles and to select the metaverse environment that guarantees sustainability (Luka, 2014). At this stage, it is essential to overcome cognitive barriers, which generates innovative ideas that cater for learner needs. It is therefore important to find common areas of weaknesses and to evaluate the resources which are already available in-world, as well as their distribution. The following grid can be used as a guide (Figure 4).

Learner needs	Solution 1	Solution 2	Resources available	Metaverse biome(s)

Figure 4: Ideating solutions & evaluating resources

2.3.3. Developing through immersion

To develop ideas from the 'Ideate' stage, ideas are combined in different destinations evaluating possible solutions. Han suggests that the solutions be tested to make adjustments by making notes of the success and failures based on learner outcomes in-world. By testing, retesting, adjusting, prototyping and experimenting with different groups of learners, conclusions are reached and decisions are finalised. It is worth pointing out that each group of learners may have different needs and it is therefore essential to return to the previous stages of the process. A simple grid is drawn to keep a record of these processes and conclusions (Figure 5).

Dates	Level/ Class	Learner Needs	Lesson Aims	Metaverse Biome(s)	Recurring limitations	Adjustments required

Figure 5: Materials development grid

2.3.4. Implementing through iteration

At this stage, principles of effective communication are applied in order to implement a solution on the instructional material and the environment to be selected. Also, the content of the syllabus, the activities and tasks are selected while the results are interpreted in order to maintain learner involvement and motivation. Ideas, observations, needs, developments, reactions and modifications are equally taken into consideration to determine additional iterations. Figure 6 illustrates some points to consider while preparing a lesson in the metaverse at this stage of the design process.

Date	Learner Needs	Lesson Aims	Metaverse Biome(s)	Task(s)	In-world affordances

Figure 6: Implementation grid

2.4. Activities and tasks

To carry out tasks (Ellis, 2003), the participants use their haptic devices or similar peripherals, whenever available, in order to leverage stereoscopic imagery and spatial audio that create the illusion of depth and space (Masero, 2023). For the case study in spaces such as Spatial.io, FrameVR and Kitely or Second Life, the learner is not restricted by the use of wearables and can participate free of charge. In the target language, they build 3D objects and learn by creating HUDs and fictional or non-fictional spaces. The process involves the educator demonstrating the construction process in-world, then through cooperation they create together before showing their final creations. This kind of gamified learning can engage learners in overcoming language barriers by using scaffolding techniques and persistent efforts for further practice (Gibson, 2014). As part of Immersive Storytelling and Transmediality (Jenkins, 2007), from a first-person perspective, they can ‘live’ in the afore-mentioned spaces and immerse in their content, seeing places that are impossible to visualise in the physical world. Alternatively, the language learner designs their fictional character and chats with them online in a special platform, inworld.ai, after building a knowledge base and even determining the pitch of the hero’s voice as with our example of “Alice” in Figure 7.

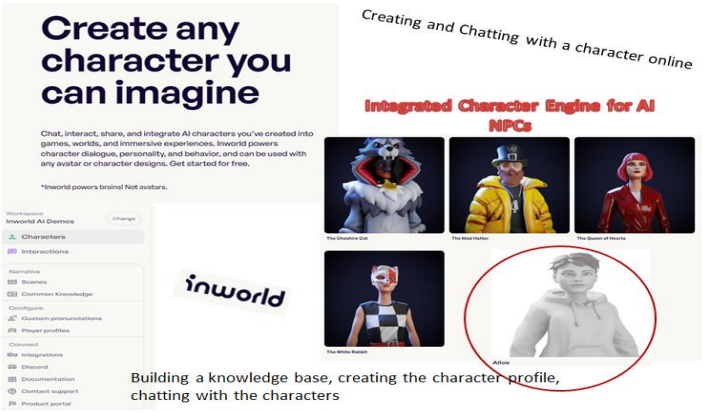

Figure 7: AI NPCs

Through their avatar, with emoting HUDs or Gestures, the TESOL learner is motivated to take part in simulations, role plays and perspective-taking, drama and immersive scenarios to learn about self-exploration and social or emotional skills (Sadler, 2012) . They teleport to carry out treasure hunts, or quests, play immersive games, go on virtual trips, and impersonate characters or converse with chat bots in-world. As part of the learning experience, they also take part in the machinima-making process (Galani in Thomas & Schneider, 2022), by having their voice and their avatar recorded during a task. Machinima is a type of film recorded in-world uploaded on a channel online, a neologism for machine and cinema (Galani in Schneider, 2016) which can enhance the learning outcome and gives learners the opportunity to overcome the 'online disinhibition effect' (Thomas p. 110, and Suler in Thomas, p. 124, 2021). Based on the lesson aims, the course participants are involved in describing their paintings for DALL.E AI or PlaygroundAI to produce the visual. If the result is not satisfactory, based on their description, the learners modify it by giving more details, experimenting with Filters, expanding prompts, or excluding unwanted details before generating the images anew. The resulting portraits or paintings are exhibited in a special gallery which has been named 'TESOL World of A.I. Art' and can be accessed for free on Spatial.io https://www.spatial.io/s/TESOL-World-of-A-I-Art .

A further example of a task around Sustainable Development Goal 11 on 'Tourism, Travel and accidents' involves the learner walking around the area of the train accident, designed by the educator in FrameVR based on learners' prompts, in order to take the roles of a doctor, passenger, officer or

paramedics and carry out dialogues around the event. In a different lesson, the course participants immerse in a simulation especially built to resemble a garage with surrounding shops where conversations take place practising language on mechanical failure and repairs. On the course "English for Travel" at A2 level, with their avatars, the group of participants also carry out role plays and go on quests in order to explore and practise the language required for sea travel and tourism or for parts of the harbour the educator has built. On their mobile phone or browser, they follow the link as guests or by using their name to immerse in a number of simulations and create machinima, resolve dilemmas, build objects, go on field trips or interact with chat bots and Non player characters (Figure 8 in Spatial.io and FrameVR). Those who have difficulty logging in carry out the tasks through their educator's shared screen, watch the machinima filmed or record their voice to create one (Galani in Thomas & Schneider, 2022).

Figure 8: Teacher-built biomes on SDG 11 for Sustainable Transport

An indicative example of a teacher's guide considering all the steps of the Design Thinking process can be encapsulated in the following Figure (9) which contains all the necessary elements while planning.

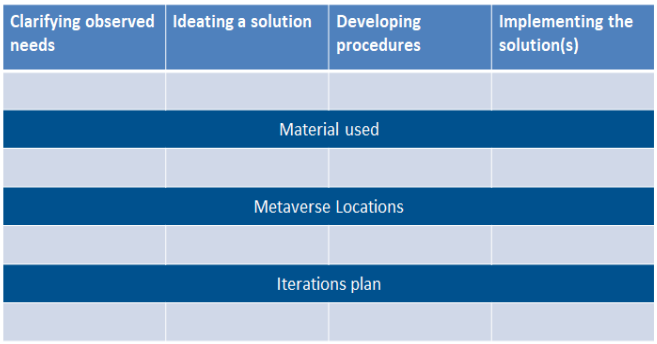

Figure 9: Teacher's Design Thinking guide

2.5. Learner feedback

After carrying out short-scale, end-of-course class surveys on surveyplanet.com, it is confirmed that the processes and methodology used for teaching English in the metaverse destinations were received positively (Galani, 2015 & 2023). The class participants were motivated to enter the environments to carry out tasks and to improve their language skills. Indicatively, the group "English for Tourism", consisting of twelve women and four men, actively and eagerly used the educational tools employed and responded positively in the survey. To the question whether their educational aims have been fulfilled, fourteen of the learners who were present responded affirmatively. Out of sixteen class participants in this group, twelve found the class use of Virtual Reality and Virtual Worlds useful, one did not, while two replied that 'the lesson is not as fast as expected in VR/VWs' and 'perhaps, not for the older participants'.

All of the class participants often used the spaces in question, as indicated in the survey. In the same group, the learners were asked to evaluate how easy it was to use the Virtual environments in which they were immersed for our lessons (Figure 10). Seven of them responded positively, five of them were negative while two said 'Other: Yes, very much so but I believe that is not easy for older people' and 'Other: I think it is easy'.

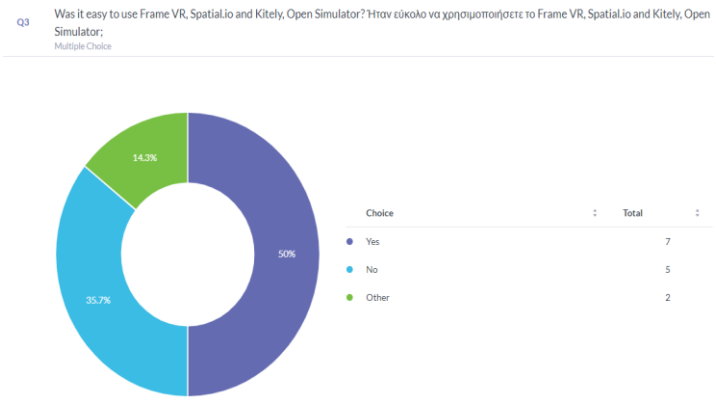

Figure 10: Evaluating the use of FrameVR, Spatial.io, Kitely and Second Life

3. Conclusion

This paper has outlined the main characteristics of Design Thinking with its implications for TESOL education in the metaverse. Even if this framework is based on short-scale field groups and the limited contemporary bibliography currently available, it aspires to encourage an immersive design thinking culture and further research that opens incentives for language teachers' professional development and the enhancement of learner skills, out of the ordinary restrictions of a single coursebook. As the language educator's main mission is to motivate and involve the learner through class activity in the target language, this can be achieved by providing innovative and memorable immersive learning experiences simulating life instances and equipping the learner with 21st century skills, focusing on five dimensions suggested by Koh et al. (2015): Social-cultural, Cognitive, Metacognitive, Productivity, and Technological dimensions.

Based on bibliographical but also on empirical analysis, it is apparent that to deliver systematic and effective teaching in Virtual Reality, Virtual Worlds and Artificial Intelligence, it is essential to devote time to carefully prepare the processes and materials for learning to ensure sustainable outcomes. *Immersive Design thinking* comes as a particularly effective teaching process that enhances creativity, builds linguistic and technical skills, helps students think outside the box, engages the learner with design activities, and highlights their talents (Tsalapatas et al., 2019). To address possible challenges in the metaverse, educators should always be open to revisiting their initial observations, overcoming barriers, experimenting and iterating the process. By applying this human-centred approach, the educator in the

position of a designer in the metaverse contributes to further classroom-based research and proposes a nonthreatening and more effective solution to the challenge of dealing with the restlessness of more technologically-orientated generations and their needs. In dealing with language learner difficulties, teacher-designers can be more prepared to explore different metaverse affordances, while they create practical and ingenious solutions. Besides, creativity plays an important part when dealing with real-world problems that are often complex in the context of the challenges of contemporary society.

As Mulders (2020) suggests that *'several educational benefits of implementing VR have been reported in the literature',* it is therefore an essential part of twenty-first century education to inform their own teaching practice in the rapidly-changing world, and to prepare learners of any age group to face new situations in more disciplines than the Second or Foreign language teaching, in an inclusive, optimistic and empathetic way, based on the *Immersive Design Thinking* approach.

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