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Implementation of Virtual Worlds to Promote Distance Practice Teachers' Participation in the English Learning Process

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Abstract. Distance education has adopted innovative technology-assisted approaches to improve teacher engagement, with virtual worlds emerging as a potentially promising tool for enhancing the participation of distance practice teachers in the learning process. In this context, the purpose of this study is to investigate the incidence of using virtual worlds as a resource to increase distance practice teachers' participation in the learning process. An action research design that incorporated a combination of both quantitative and qualitative research was used to carry out the study. The techniques applied to collect the information were a survey, an interview, and an observation checklist. The sample consisted of 116 participants (44 male and 72 female) whose ages ranged from 25 to 35 years. They were enrolled in the English major of a distance program at a private university in a southern city in Ecuador. They participated actively in 16 synchronic activities during the intervention period (one per week). The results showed that the use of virtual worlds allowed pre-service teachers to increase the frequency of their participation during synchronic classes. Besides, practice English teachers had positive perceptions regarding the use of virtual worlds as a resource for learning because the sense of presence provided by the platform motivated them to participate in the activities. From the findings of the study, it is recommended that further research consider the use of virtual worlds for fostering participation in on-site learning environments to further triangulate the results of the study and for comparative analysis.

Keywords: distance education; participation; practice teachers; virtual worlds

1. Background of the study

The use of technology to enhance the learning of English as a foreign language (EFL) has greatly increased due to globalization. This study explores the implementation of virtual worlds to promote distance practice teachers' participation in the learning process. Indeed, learners are favoured with a variety

of tools that can be used to study and reinforce the contents of subjects, especially those university students who have registered in a distance program, whose limitations do not allow them to have the opportunity to ask and answer questions any time neither receive feedback nor participate during classes (Oliveira et., 2018).

In this context, virtual worlds (VW) are one of those technological resources that contribute to overcome the above-mentioned difficulties found in a distance program. Virtual worlds are combined systems of networked online devices and sources, which allow learners who study in a distance program, to be more active since it provides a similar environment to a real one using avatars (Zhang as cited in Shafieiyoun & Safaei, 2013; Krassmann et al., 2020). Additionally, virtual worlds improve students' intrinsic motivation (Francke & Alexander, 2018) and their learning experience (Nøgaard et al., 2018), provide more opportunities to work collaboratively, interact, and participate through virtual field trips, virtual city tours, role-playing, and creative construction work (Chen, 2016).

As any other resource, virtual worlds have their own characteristics and features. Regarding their features, Martínez (2012) mentions that the main ones are persistence, interactivity, physical presence, chat, gestures, and voice. According to this author, persistence deals with the simulation of a 3D space; interactivity involves the interaction among participants; and physical presence is concerned with the avatar that represents the user. Regarding avatars, Girvan and Savage (2019) argue that they create several perceived possibilities for education, offering opportunities for learning process, as learners co-exist and share a virtual space.

Some studies have been carried out regarding the use of virtual worlds in the educational context. Mørch et al. (2018) researched three contexts (social, pedagogical, and emotional) created by teachers to foster collaborative learning in virtual worlds. The results indicate that using avatars promotes students' social interaction and collaborative skills. Besides, virtual worlds help teachers and students to express their emotions in many situations.

The study carried out by Díaz et al. (2020) investigated the use of virtual worlds to motivate students when learning as well as to determine the learners' perceptions of the usefulness and functionality of virtual worlds. Findings demonstrate that participants showed high interest in navigating and interacting with the virtual world. Moreover, virtual world environments facilitate learning using computers or mobile devices in both synchronous and asynchronous classes.

Contreras et al. (2018) researched a methodology for implementing VW with open simulator in two subjects of a distance program. The results revealed that most students perceive virtual worlds as an easy resource to interact as well as to move within due to its functionality. Additionally, teachers considered VW as a very entertaining tool to enhance learning through real practices.

Although there has been research in the field of virtual learning worlds, it has not been investigated how virtual environments influence on distance students' participation. In our context, in which the present study has been carried out, distance EFL practice teachers learn by themselves and must complete different graded asynchronous activities (forum, quizzes, and assignments) as parts of their learning process. Additionally, they must participate in some synchronous activities such as chats or video collaboration sessions. However, students' participation is low during the aforementioned sessions because they do not feel motivated to interact or complete the activities. Besides, the technological characteristics of the platform, through which this teaching-learning process occurs, do not promote active participation.

To overcome this limitation, virtual worlds were posed as an alternative to increase our EFL practice teachers' participation since this platform has some engaging elements such as avatars that motivate them to participate dynamically during the synchronic activities. Therefore, the purpose of the present study is to provide insights into the use of virtual worlds as a resource to enhance distance practice teachers' participation in the different synchronic activities, which might be beneficial for future teachers. Specifically, it sought answers to the following: 1) How do virtual worlds influence English practice teachers' participation during synchronic activities? 2) What are English practice teachers' perceptions of the use of virtual worlds as a resource for learning?

2. Literature Review

2.1 Distance Education

Distance education started in the 19th century; since then, it has had a notable impact on the educational field (Saykılı, 2018). This modality emerged for some reasons such as the geographical space between people and educational institutions and socio-economical aspects; the willingness to learn; and the rapid growth of technology (Casey, 2008). Along time, distance education has been defined in different ways. According to Bagriacık (2019) it is a type of instruction in which students learn individually or in groups, but they neither have physical contact with the instructor nor attend an educational institution. Besides, Schlosser and Simonson (2009) state that distance education is a program where students learn separately through telecommunications systems, which allows them to interconnect all learners by using different technological resources. Holmberg (1989) complements these definitions by adding that distance education allows students to learn at different times and in different places; it means that they decide when and where to study and access to the provided material as well.

Additionally, for Keegan (1996) five elements need to be considered to define distance education. The first one lies in the quasi-permanent separation between the teacher and the learner, setting it apart from traditional face-to-face education. The second one involves the active engagement of an educational institution in creating learning materials and offering student support services. The third element pertains to the near-constant lack of a learning community during the entire learning period. In this setup, individuals are typically educated on an

individual basis rather than in collective settings. Periodic gatherings may occur for educational and social interactions. The fourth one fosters the interactive communication, allowing students to engage in dialogue with teachers – a feature that differentiates it from other educational technology applications. The fifth element implies the use of various technical media such as print, audio, video, or computer technologies to connect teachers and learners, delivering the course content.

In the context of technology, Berge (1995) states that it is a very important tool in distance education since, besides promoting interaction, it allows learners to find and experiment some ways that fit their own styles of learning. This author also mentions that one of the benefits of technology is that it makes students construct their own knowledge, which is created through engagement, dialogue and interactivity (Rajesh, 2015). Certainly, according to Makarenya, et al. (2020) distance education requires the utilization of telecommunications and electronic devices that allow students to receive instruction from a remote location.

Currently, computers and telecommunications enable the development of interactive and integrated environments in distance education, surpassing conventional methods like pen-and-paper correspondence. Vásquez et al. (2006) assert that technological advances allow distance learners not only sharing knowledge but learning in a meaningful way since their teachers make use of technological tools (Internet, videoconference, chat sessions, among others) for promoting their interaction in a synchronic and asynchronic way (Martínez, 2008).

2.2 Virtual Worlds

The term virtual worlds is defined by some authors in different ways at different times. One of the important definitions is the one stated by Girvan (2018) who affirms that a virtual world is an environment and what sets it apart from the real world is the various experiences it provides for users, mainly through the use of avatars and other technical features. Similarly, Bartle (2003) states that VW is a self-contained environment that its users perceive as complete in itself. Koster (2004) complements this definition by explaining that a virtual world can be used at the same time by many users, who are represented by avatars.

Regarding the characteristics of virtual worlds, Kahai, et al. (2023) assert that VW provides a level of realism and immersion that is not found in other online learning settings. When learning in a virtual world, individuals often engage in spatial navigation, reasoning, object manipulation, and memorization of virtual spatial locations and objects. Shafieiyoun and Safaei (2013) mention that social presence is another important characteristic of virtual environments because it makes students feel present as in an on-site class. Based on it, Zhang (2009) and Krassmann et al. (2021) mention that virtual environments allow distance education students to work in similar situations as in real environments because of the interactions between avatars and virtual tools. Besides, virtual worlds offer a stimulating and new environment to improve learning for students to generate further interactive learning experiences. Furthermore, virtual learning worlds have been provided as an adaptable and independent learning environment for

students (Richardson & Swan, 2003). All these features make virtual worlds a good opportunity for distance education students to acquire knowledge and develop their competencies.

In this context, Gregory et al. (2019) state that VW plays a crucial role and is considered as a valuable tool in the educational field because it provides new and innovative forms for supporting the learning process in general. Shafieiyoun and Safaei (2013) consider the use of virtual environments as significant and important tools in the educational area, especially for online and distance settings. They also highlight that virtual environments give the opportunity to create communities, foster trust, increase the sense of presence in learning, play with roles and identity, and undertake activities not normally physically possible. Indeed, the educational potential of virtual worlds has been recognized by educators, who consider them as an available and efficient resource to support the teaching process (Jacka, 2018). Virtual worlds are also recognized as a pedagogical opportunity and immersive space that students can take advantage of; all of these, make virtual environments an authentic context in which students can create and share virtual assets and develop their scope of learning (Savin-Baden, 2010).

In this regard, Peterson (2011) states that the advantages of virtual worlds for educational purposes are great because they constitute very useful spaces for language learning tasks in which students can interact in the target language; they also provide socially interactive learning opportunities such as virtual field trips, virtual city tours, role-playing, and creative construction work. In addition, Richardson and Swan (2003) state that collaborative learning is another advantage of virtual environments because they permit students to work in groups in which every student must participate and collaborate effectively to reach the goals of the group (Hedberg & Brudvik, 2008).

Other authors have researched the advantages of VW and they have come to the conclusion that most of the participants showed a positive attitude toward the use of virtual worlds in a collaborative learning setting (Alshumaimeri et al., 2019). Yu et al. (2020) demonstrated that VW contributed to reduce learners' foreign-language anxiety and improve their speaking proficiency. Krassmann et al. (2020) found that the sense of presence through VW was perceived as a positive factor in the students' learning. Demirbilek and Koç (2021) evidenced that VW is used as another form of education for meeting students' social needs using today's advanced technology.

2.3 Students' Participation in EFL Classroom

In the educational field, students' participation refers to actively taking part in classroom discussions, debates, questioning, inquiry, and explanations, which allows students to construct and acquire in-depth knowledge (Simovska, 2007). In this context, participation plays a vital role in achieving learning outcomes (Sparapani et al., 2023; Kim, 2013) since it promotes knowledge acquisition and critical thinking, and enhances the overall quality of discussions in the learning environment (Davies & Graff, 2005).

Despite the significance of promoting active student participation in the classroom, certain factors constrain it. Some of them are low levels of motivation, high levels of anxiety, and fear of making mistakes, among others, which cause students to prefer working independently and sitting at the back of the classroom (Hanh, (2020). Therefore, it is crucial teachers use some strategies to encourage students to participate actively in the classroom because it is a fundamental element of learning a foreign language (Badem-Korkmaz & Balaman, 2022). These authors also assert that making efforts to stimulate student engagement becomes significant in language educational environments, including synchronous remote classrooms.

3. Method

3.1 Research Design and Participants

In the present study, action research design was used using mixed methods of quantitative and qualitative approaches. Creswell (2015) asserts that this design approach enables educators to collect data for the purpose of tackling and resolving specific, real-world issues within educational settings.

The sample consisted of 116 pre-service teachers, 72 female and 44 male, whose ages ranged from 25 to 35. They were enrolled in the English major of the distance program of a private university in Ecuador. This sample was intentionally chosen, following the principle of selecting participant groups that happen to be available (Mertler & Charles, 2008).

3.2 Instruments

Table 1. Presents the list of research instruments and their purpose.

Table 1: Research Instruments

Instrument	Purpose	Number of items
Checklist (Observation)	It helped us determine the incidence of virtual worlds to promote students' participation in this type of setting.	Six items related to students' participation
Perception's questionnaire (survey)	It allowed us to know the participants' perceptions regarding the use of virtual environments as a tool for enhancing their learning.	Nine items for eliciting answers on a four-point Likert scale.
Questionnaire (interview)	It was applied to triangulate information regarding how the use of virtual worlds impacted students' participation.	Six open questions

3.3 Procedure and Analysis

The present study lasted five months within the academic period. It was carried out through a virtual world platform and consisted of three stages. In the first stage, pre-service teachers received technological training about how the aforementioned platform works, and how to create, move and rotate the avatars around virtual worlds. This training lasted for two weeks and was done through virtual sessions. Participants were also provided with a video training tutorial for them to watch whenever they needed to refresh the information given. Additionally, the pre-service teachers received guidelines and instructions on how the synchronic activities were going to be carried out through the platform.

In the second stage, six planned synchronic activities (video collaboration sessions - one per week) were carried out by means of the virtual world platform. Each one of them lasted two hours, time during which the instructors taught different topics such as how to write paragraphs and essays, main ideas and supporting details, organization of ideas, punctuation, and mechanics. These topics were covered through examples that were analyzed by students to identify and correct errors. Before starting each session, the participants chose and customized their avatars, and went to the virtual classroom. During the sessions, students participated actively and teachers provided feedback to reinforce students' knowledge. In each virtual session, the student's participation was registered in a checklist sheet to be analyzed quantitatively later.

The third and final stage, was an interview which was conducted to support and triangulate the information gathered from the checklist. Additionally, a survey was administered to the students to know their perceptions regarding the use of virtual worlds to enhance their learning process. The results from the survey were analyzed quantitatively using the SPSS software, and the qualitative data from the interview were used as excerpts in the discussions.

4. Results

This section includes descriptive statistical analysis of the findings of the present study, which are related to the research questions.

4.1 Influence of virtual worlds on English practice teachers' participation during synchronic activities

Table 2. English practice teachers' participation in virtual worlds during synchronic activities

ITEMS	1st class	2nd class	3th class	4th class	5th class	6th class	7th class	8th class
1.Students participate actively	15%	21%	29%	45%	50%	62%	70%	87%
2.The student shows interest in participating	17%	24%	35%	40%	51%	68%	82%	90%
3.The student interacts with the teacher	19%	33%	40%	49%	58%	72%	80%	87%

4.The student interacts with his/her classmates	21%	35%	44%	50%	59%	77%	79%	82%
5.The comments and ideas are relevant to the examples being analyzed	12%	18%	24%	29%	38%	58%	60%	64%
6.The ideas and comments regarding the examples analyzed are supported	6%	11%	18%	23%	25.%	33%	39%	41%

Table 2 provides a comprehensive overview of the statistical values derived from the checklist used during the observation. The findings reveal a significant positive shift in various aspects related to students' participation, namely their interest, interaction, and contribution. This notable increase can be attributed to the substantial rise in the number of participants in each class, particularly in the final session, where the participation rate reached its highest level.

Taking as a reference the first and last class, in the first statement (students participate actively) it can be observed an increment of 72%. Regarding the second statement (the student shows interest in participating) the difference is 73%. Referring to the third statement (the student interacts with the teacher) the progress is shown in 68%. Concerning the fourth statement (the student interacts with his/her classmates) it is observed a development of 61%. As for the fifth statement (the comments and ideas are relevant to the examples being analyzed) it is shown an advance of 52%. Finally, concerning the sixth statement (the ideas and comments regarding the examples analyzed are supported) there is a difference of 35%.

Comparing the first and last class, significant improvements can be observed across various statements related to student participation. In the first statement, which measures active student participation, there has been an impressive increase of 72%. Similarly, in terms of the second statement measuring student interest in participating, the difference reflects a substantial growth of 73%. The third statement, assessing student interaction with the teacher, exhibits notable progress with a positive change of 68%. Additionally, the fourth statement measuring student interaction with classmates displays a commendable development of 61%. When it comes to the fifth statement, which determines the relevance of comments and ideas to the examples being analyzed, there is a significant advancement of 52%. Finally, concerning the sixth statement evaluating the support for ideas and comments regarding the analyzed examples, a noticeable difference of 35% is evident, indicating an encouraging improvement.

4.2. English practice teachers' perceptions of the use of virtual worlds as a resource for learning

Table 3. Perceptions of the use of virtual worlds as a resource for learning

N.	Item	Totally agree	Agree	Disagree	Totally disagree
1	The use of virtual environments motivated me to learn.	84%	10%	6%	0%
2	My interest towards learning increased due to the use of virtual environments.	22%	74%	4%	0%
3	The virtual environments allowed me to understand the topic in a better way.	42%	55%	2%	0%
4	Students-students and teacher-students interaction improved through the use of virtual environments.	69%	28%	3%	0%
5	The class development was more dynamic through the use of virtual environments.	48%	52%	0%	0%
6	The sense of presence provided by the platform motivated me to participate in the activities.	85%	15%	0%	0%
7	The use of virtual worlds is an innovated practice for my learning.	60%	35%	5%	0%
8	Access to virtual worlds was easy and intuitive.	60%	30%	10%	0%
9	The activities developed in virtual worlds contributed to the learning of the subject.	45%	53%	2%	0%

The survey results obtained from the participants demonstrate a high level of agreement regarding the positive impact of virtual worlds on various aspects of their learning experience. Notably, 94% of participants (84% totally agreed and 10% agreed) acknowledged that virtual worlds significantly influenced their motivation to study the subject matter. Furthermore, in terms of practice teachers' interest in the subject, 22% of them totally agreed and 74% agreed that their interest increased when utilizing virtual worlds. When considering the participants' understanding of the covered topics, 42% of students totally agreed and 55% agreed that virtual environments had a notable impact on their

comprehension. Regarding interaction, 69% of participants totally agreed and 28% agreed that the use of virtual worlds improved interaction between teachers and students as well as among students themselves. The majority of pre-service teachers (100%) agreed that virtual worlds made classes more dynamic and interesting, where 48% totally agreed and 52% agreed. All practice teachers (100%) expressed eagerness to participate in the various proposed activities due to the motivation provided by real-time simulated classes, with 85% totally agreeing and 15% agreeing. In relation to the perception of virtual worlds as an innovative learning method, 60% of participants totally agreed and 35% agreed. Similarly, 90% of pre-service teachers found the access and use of the platform to be easy and intuitive, with 60% totally agreeing and 30% agreeing. Lastly, 98% of participants (45% totally agreed and 53% agreed) believed that virtual worlds helped increase their knowledge, emphasizing the positive impact of these platforms on their learning outcomes.

5. Discussion

In this section, we analyze qualitatively the previous results to delve and examine the complex dynamics that shape the experiences of English practice teachers' participation during synchronic activities as well as their perceptions regarding the use of virtual worlds as a resource for learning.

5.1 Influence of virtual worlds on English practice teachers' participation during synchronic activities.

According to the results, it is evident that virtual worlds impacted positively the participation of English pre-service teachers in the synchronous activities since they showed a progressive improvement in both quantity and quality aspects. Concerning quantity, observations revealed that students increased their participation frequency, primarily due to two factors: the physical presence offered by the platform and the use of avatars to represent themselves, which are key features of the platform. The table below showcases chosen quotes from the interviews, discussing students' views on how physical presence impacts their participation levels.

Table 4. Student's perceptions on how physical presence impacts their participation levels

Question	Teacher's excerpt
How you think the physical presence and the use of avatars has helped you to increase your participation in the synchronous activities?	<p>"... In fact, the physical presence of avatars has significantly enhanced my engagement during synchronous activities..."</p> <p>"... Having a visual representation through avatars creates a sense of presence, making me feel more connected and involved in the virtual environment..."</p> <p>"...This immersion has boosted my active participation and overall enthusiasm in the activities."</p>

In fact, these features helped students feel as if they were in a physical environment, enabling them to actively participate and interact with their teacher and classmates by asking questions, expressing their opinions, and providing support among them. In this context, Occhioni and Paris (2021) suggest that virtual worlds can serve as an effective platform for educational institutions to involve students in exploratory and collaborative activities, providing them with a sense of "presence" and togetherness. Regarding avatars, Linganisa, et al. (2018) state that students found value in using avatars to represent their identities in virtual worlds. Gadille et al. (2023) highlight that in virtual educational environments, the avatar serves as an integral component in the framework of empathy and detachment to facilitate situated learning. Besides, students, represented through their avatars, have the freedom to explore and interact with objects from various angles, leading to increased active participation (Krassmann et al., 2021).

With respect to the quality of practice English teachers' participation, it was observed a notable improvement because of the platform's facilities that enable participants to enhance synchronous communication among them. This innovative feature fosters active engagement, collaboration, and meaningful interactions, ultimately leading to a more dynamic and enriching learning environment. This characteristic (synchronous communication) allowed teachers to provide immediate and progressive feedback, which helped students gain confidence in their participation. Consequently, the quality of their contributions improved progressively, becoming more relevant and well-supported. In this regard, Girvan and Savage (2019) mention that VW offers learners the chance to receive feedback from their peers and teachers which enables them to contribute to the creation of their projects.

5.2 English practice teachers' perceptions of the use of virtual worlds as a resource for learning

The results from the survey clearly demonstrated that most participants held a positive perception regarding the use of virtual worlds, as it significantly increased their interest and motivation to study the subject content. This finding is consistent with the research by Kamińska et al. (2019) acknowledge that virtual worlds used for educational purposes have the potential to promote motivation, engagement, and active learning in an evolving educational environment. Additionally, the participants reported that the activities conducted through virtual worlds greatly enhanced their understanding of the topics covered in synchronous activities. These factors collectively contributed to the improvement of the participants' learning and the development of competencies related to the subject. In this respect, Ghanbarzadeh and Ghapanchi (2021) found that utilizing virtual worlds improves learning outcomes compared to traditional methods, resulting in enhanced educational achievements.

Findings regarding the simulated classes conducted in real-time through video collaboration sessions, a prominent feature of virtual worlds, revealed their significant impact on students. These dynamic sessions effectively motivated

student participation and facilitated increased interaction between teachers and students, as well as among students themselves. Ghanbarzadeh and Ghapanchi (2020) state that VW have the potential to be used for education, enabling practical problem-solving activities between students and teachers, and making a positive societal impact. Furthermore, Ferreira and Ribeiro (2022) emphasize that body movement in immersive environments enhances student learning by providing an immersive multimodal experience that allows them to engage with virtual worlds dynamically, interactively, and autonomously. The table below features excerpts from interviews with students discussing their perspectives on virtual worlds as didactic resources and innovative educational practices.

Table 5. Student's perceptions about virtual worlds on virtual worlds as didactic resources and innovative educational practices.

Question	Teacher's excerpt
What do you think of the use of virtual worlds as a didactic resource for learning	"... Virtual worlds captivated me as a learner, fostering active engagement through immersive experiences."
	"Virtual worlds facilitate interactive learning, encouraging collaboration and hands-on exploration..."
	"Virtual worlds enhanced my engagement to the class through interactive and immersive experiences..."
Do you think that the use of virtual worlds constitutes an innovative practice?	"...Virtual worlds have enabled students from different cities to collaborate in real-time, which fosters global communication and cooperation, breaking down geographical barriers..."
	<p>"...Virtual worlds has been an innovative practice because they offer immersive and interactive experiences, capturing students' attention and keeping us engaged in the learning process..."</p> <p>"I think that Virtual worlds facilitate experiential learning, students can actively participate and learn by doing. This hands-on approach can enhance comprehension and critical thinking skills."</p>

Regarding the use of virtual worlds as a didactic resource in synchronous classes, a high percentage of participants perceived it as an innovative practice that significantly enhanced their learning experience. In this regard, Ghanbarzadeh and Ghapanchi (2021) assert that the use of VW in teaching is an innovative and creative way to positively impact student learning. According to the survey results, students expressed that the synchronous activities conducted in the distance program on a regular basis did not allow them to use avatars. However, virtual worlds provided distance students with the ability to utilize avatars, which instilled a sense of virtual presence and increased their confidence to actively participate in these activities. These results are aligned with the study conducted by Irwin et al. (2019) in which, learners who embodied idealized avatars showed more enjoyment and engagement with course materials. In terms of access and usability, participants expressed a consistently positive opinion, asserting that the

virtual worlds tool was easy to use and intuitive. Moreover, they did not encounter any technical difficulties when accessing the platform, which can be attributed to the training provided at the beginning of the intervention.

6. Conclusion

The use of virtual worlds has been a fundamental factor in enhancing learner participation during synchronous activities, leading to both increased quantity and improved quality of engagement over time. This has positively impacted cultivating students' enthusiasm for active involvement. The success of this platform can be attributed to its features and the comprehensive training sessions provided to students at the outset of the intervention. Physical presence and the use of avatars have emerged as critical factors in fostering student participation, enhancing motivation, and sustaining complete engagement. Importantly, our study found that English pre-service teachers held positive perceptions of virtual worlds, demonstrating heightened interest and motivation to learn the contents. Their experience with VW yielded rewarding results, enabling both academic and technological growth. Furthermore, the use of virtual environments significantly improved students' comprehension of the presented content during synchronous activities, resulting in enhanced subject knowledge and competencies.

Despite these positive results, the present research was limited by the low-quality Internet access that some students experienced during the synchronic activities, which influenced their experiences.

The pedagogical implication of the present research relies on the integration of immersive and interactive technology into teacher training and professional development. This could be achieved through the creation of virtual classrooms where pre-service and in-service teachers can practice their teaching skills, engage with students, and receive feedback in a safe and controlled digital space.

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