Incorporating a VR experience in the EFL classroom: teaching the events of the 5th of November

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Abstract

Teaching English as a foreign language can be a delicate process that can easily be bettered through the use of educational technologies, which can assist in turning the lesson into a cross-curricular experience with multiple benefits. This paper presents a study that explores the use of a virtual environment as a pedagogical tool to teach the historical events surrounding the 5th of November to secondary education students and to learn English as a foreign language. The study aims to investigate the impact of the virtual prototype on student engagement and motivation, as well as the potential benefits for their acquisition and retention of the historical knowledge and related vocabulary. The study methodology involves a pre- and post-assessment of student knowledge and attitudes through the use of two questionnaires, conducted with a sample group of 12 secondary education students. The results of the study demonstrated a significant increase in student engagement and motivation following the implementation of the prototype, while their historical knowledge and the related vocabulary items were significantly increased after the participants' exposure to the prototype. The study's findings highlight the importance of incorporating interactive and immersive elements in educational interventions to enhance student engagement, motivation and information retention.

Keywords: Virtual Reality, education, secondary education, English as a Foreign Language

Introduction

Although Teaching English as a Foreign Language (EFL) holds an important position in modern education, various challenges arise for both students and teachers. Factors such as the unexpected rise in online learning, the adoption of traditional language learning models, limited resources, cultural differences, and insufficient exposure to the target language contribute to problems in both receptive and productive language skills (Hibatullah, 2019; Nugroho et al., 2021). Particularly in non-authentic English-speaking environments or educational spaces where English is considered a secondary subject, students often struggle with listening comprehension, pronunciation, accurate communication, and lack of motivation to engage with reading and writing. However, to address these challenges, an immersive approach to teaching English using Virtual Reality (VR) technology has emerged as a promising solution, catering to individual learners' needs and learning styles (Papanastasiou et al., 2019). VR technology not only provides a multisensory and interactive experience, allowing students to learn in a more engaging and realistic manner, but it also gives them the chance to practice language skills in authentic contexts, fostering motivation, engagement, and retention of information.

This paper examines the use of VR technology in EFL teaching and presents a prototype which aims to offer new and exciting opportunities for students of secondary education to develop language proficiency and cultural awareness.

Related work

Nowadays, Virtual Reality (VR) is utilized in many fields of education (Pellas et al., 2021) including language learning. Indeed, with VR's ability to "provide a sensory illusion of being present in another environment" (Zhou et al.,2022), it paves the way for more immersive learning environments to be created where students can utilize the scenery to familiarize themselves with the educational objectives.

The potential of incorporating VR practices in teaching English as a Foreign Language is examined by a plethora of researchers and educators, who agree upon the usability of such technologies in the teaching process. A new term is coined to explain this new reality and Virtual Reality Assisted Learning (VRALL) begins to note a heavy presence in language education. VR helps foreign language learning to grown in an authentic, immersive and interactive environment which motivates students and supports them through the strenuous, demanding process of acquiring a language (Cai, 2022). It also brings students in line with technological developments and broadens their horizons regarding alternative uses of technology in their daily lives. A way is therefore paved for significant cognitive development, with skills like creativity, critical thinking, planning and self-knowledge being rendered transferable to other learning contexts and real-life situations (Radianti et al., 2020).

Hua and Wang (2023) stress the positive effects of VR in language learning as they claim that along with the cognitive development, psychological and emotional aspects of students' mental makeup are catered for, given that engaging virtual environments incorporate exciting experiences that through satisfaction, promote teamwork and create motivation for further engagement with the language. Ijaz et al. (2017) also highlight that introducing VR into education creates a stress-free and lenient environment, where learners can seamlessly explore and experiment with language in a safe and controlled environment, giving them the freedom to make mistakes and learn from them.

The case of "The 5th of November" VR room

"The 5th of November-Gunpowder Treason Plot" is a virtual room that serves as a teaching aid for English language teaching in secondary education. It encompasses a Virtual Reality (VR) experience aiming to create conditions for Content and Language Integrated Learning (CLIL) and amplify the EFL classroom. The room is based on the events of Bonfire Night as presented in Unit 6.2 of the English book Think Teen! (Think Teen!, 2009) of the 3rd Grade of Junior High School. Following Gardner's Theory of Multiple Intelligences, the space offers a rich VR experience which will incite students' interest in exploring historical events through multimodal virtual aids and gamification techniques, while at the same time, the incorporation of CLIL will help students develop a positive attitude towards languages and language learning as a whole (Lasagabaster & Sierra, 2009).

Although mainly designed for classroom use, students can access the prototype from home to review content at their leisure. Accessing the virtual prototype requires students to visit the Artsteps website or download the Artsteps app from Google Play Store or the App Store.

After the prototype has been accessed and the students have entered the virtual space, there will find themselves within the entrance hall, which serves as the starting point.
The virtual space includes six areas of interest, five rooms and one interactive labyrinth. Each of the rooms holds different activities and embedded educational content, which are as follows:

Entrance Hall, Introduction. The room serves as the Entrance Hall, which will include a short description of the space's layout, as well as an introductory video of the infamous 5th of

November song "Remember Remember the 5th of November", which will set students in the mood, refresh any previous knowledge or help the teacher understand what other areas of the subject to focus on.

Vocabulary and Listening Training Room. The second room focuses on presenting the vocabulary of the unit through a series of interactive picture frames that will allow the students to browse through and review them at their own time. It also hosts an embedded YouTube video with the unit's listening activity and an image frame with some True or False questions accompanied by the QR of the exercise for enhanced accessibility (Fig. 1.)

Figure 1. Second room displaying the Listening exercise

Reading Comprehension Room. The third room will be taking the form of a picture gallery, each of which will be interactive and upon being clicked will start revealing the events of the 5th of November in written form. Within this room, the students will have the opportunity to browse through the images by following the blue arrows and read the provided text.

Vocabulary Activities and Reading Evaluation Room. The fourth room (Fig. 2) will focus on evaluating the knowledge the students have already acquired through the use of two exercises. It includes an interactive reading exercise, where students need to put the scrambled events in the correct order, and a matching exercise focusing on vocabulary comprehension. Both are accompanied by QR codes.
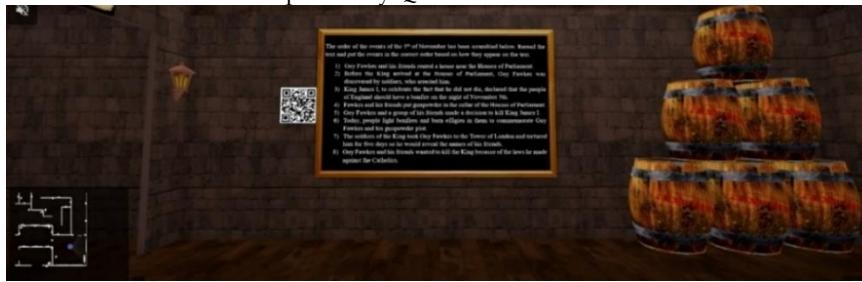
Figure 2. Room Four displaying the Vocabulary and Reading activities, Part One

Labyrinth Navigation Room. In this step, the students will be called to navigate an elaborate labyrinth within the environment of the prototype, by working individually or banding together in groups.

Homework and Speaking Practice Room. In the final room, the students will be greeted with another video, which showcases how the 5th of November is celebrated nowadays. Discussion prompts can be found on the walls, which will serve as an opportunity for reflection and revision. As a final step, the teacher will direct the students' attention towards the homework, which takes the form of a short essay.

Methodology

The main aim of this research was to assess how effective Virtual Reality technology can be when it comes to EFL teaching within and outside of classrooms in secondary education, through the use of the virtual platform Artsteps. The prototype created is meant to serve as a teaching aid for English language teaching in the form of a virtual experience that aims to creating conditions for CLIL, thus allowing students to combine learning the language and the subject matter at once. Given that, one of the fundamental aspects addressed in this research revolves around examining and analyzing the knowledge acquired by students. To evaluate the effectiveness of the virtual space, it is essential for students to engage with the prototype and compare their knowledge of the language and subject matter before and after their interaction with the virtual prototype. This allows for a comprehensive assessment of the impact and effectiveness of the virtual space in enhancing students' understanding and knowledge.

The Technology Acceptance Model or TAM (Davis, 1989) was also incorporated as a supplementary research tool in order to help assess the efficiency and ease of use of the virtual prototype by the users both within and outside of the classroom. TAM provides a framework for assessing the acceptance and use of technology by users, and this aligns with several important parameters examined in this research. Additionally, this research also aims to investigate the motivation and engagement levels exhibited by the users of the prototype in order to assess the effectiveness of VR in CLIL (Content and Language Integrated Learning) practices. Furthermore, data regarding the users' overall satisfaction was collected and analyzed to gain insights into their level of satisfaction with the virtual space and navigation.

The research questions (RQ) were:

RQ1: Do students find the prototype engaging and motivating to use?

RQ2: Are students satisfied with the functions of the prototype?

RQ3: To what extent do students perceive the prototype as useful and easy to use, according to the TAM model (Davis, 1989)?

RQ4: How did the prototype help students acquire knowledge regarding the domain's subject matter?

The chosen research design is a pilot study conducted with end-users, specifically secondary education students. This design was selected to facilitate the collection of information regarding how students perceive the utilization of VR technology for educational purposes. A group of 12 students in secondary education, namely in the second and third grade of junior high school, was selected for the study using convenience sampling, while at the same time, various methods were employed to collect data. Prior to their introduction to the virtual prototype, the students were introduced to the purpose of the project and the technology used, while they were also instructed on how to access and browse through the environment. For this step, they were encouraged to rely on a steady internet connection and preferably access the virtual space using their laptops or tablets instead of their smartphones, so that a smoother overall experience is facilitated. Following this step, the students were asked to complete a research questionnaire online, using Google Forms, with questions that

would provide demographic information and an initial assessment of the participants' knowledge of the subject matter, as well as their proficiency in the language used.

Afterwards, each student had the opportunity to personally explore and test the virtual prototype with the instructors' guidance, completing the provided activities and reading through the included content. As the students interacted with the environment, the instructors would monitor the users' activity and ask clarifying questions to help identify and resolve any difficulties they might have encountered while exploring the virtual space. Finally, upon the completion of the approximately 30-minute exploration, the participants were requested to fill out an attitude questionnaire. This questionnaire aimed to evaluate the participants' motivation and engagement levels during their use of the prototype, as well as assess the prototype's usability and overall satisfaction with the experience through 5-point Likert scale type questions. There were also knowledge questions aimed to gather data regarding the participants' knowledge of the subject matter and language following their interaction with the prototype and its embedded functions. The collected data was analyzed using descriptive statistics that would efficiently provide summaries to be discussed and inferential statistics that would assist in establishing relationships between the studied variables and drawing conclusions.

Results

The research was conducted in June 2023. A sample of 12 junior high school students were introduced to the VR prototype "The 5th of November-Gunpowder Treason Plot" after they had completed a preliminary test where their vocabulary and historical knowledge was examined. With the main aim of this intervention being the teaching of EFL, the content was offered in the English language, whereas in some cases, Greek was used to facilitate students' needs and further guidance in the virtual environment.

The initial sample consisted of 4 male and 8 female students, all of whom have completed both pre-test and post-test questionnaires. The analysis of the demographic data revealed that the average age of the students was 14.75 and it was found that 50% had previous experience with VR applications. More specifically, a significant 58% of the students had engaged with 3D games before, yet only a 25% of them had tried VR applications as an educational tool. Additionally, when asked about their daily screen time on mobile, tablet, computer, or other gaming devices, 42% reported spending 1-2 hours, while another 42% reported that they devote 3-5 hours to their digital devices. Half of the students accessed the VR prototype through their computer, while the rest visited it through their smartphones.

In the second section of the post-test, students expressed their opinion on the usefulness of the prototype and their overall satisfaction with the project. The overall response to the VR prototype was positive, with the satisfaction rate representing 92% of the participants, while another 83% found the application easy to use and navigate. In terms of engagement, the results indicated that when using the VR prototype, 58% of the students reported experiencing strong engagement, while 42% reported medium engagement. However, among the participants, only 67% found the VR prototype useful, which raises some concerns, suggesting areas for further development and improvement.

In the second section of the post-test, students provided feedback on the level of motivation or interest they experienced with each of the provided media. As indicated at Fig. 3, the elements that students consider the most interesting and motivating elements to be the virtual activities and the 3D labyrinth environment with a grade of 4.33 and 4.00 respectfully. Embedded media like videos, images and text stimulated students' interest in a similar manner (3.92), while 3D models were deemed the least engaging of all (3.58).
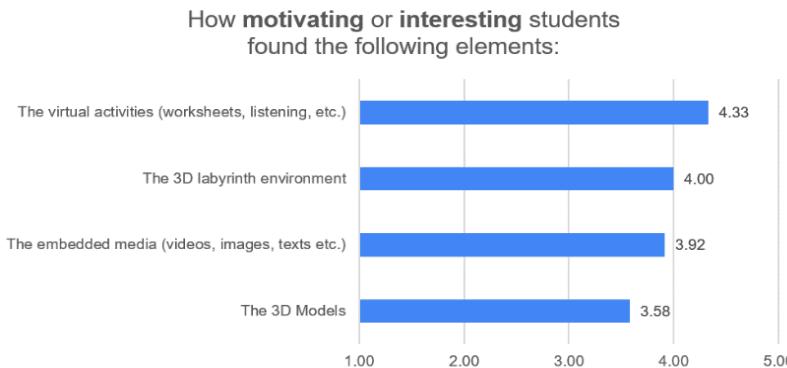
Figure 3. How motivating or interesting students found the following elements

Similarly, students proceeded to express their opinions on the usefulness of the elements they had examined previously. From the graph below, it is evident that students perceived the virtual activities and embedded media as the most beneficial elements in terms of usefulness, with high ratings of 4.42 and 4.17 respectively. However, it is worth noting that they considered the 3D labyrinth environment to be less useful (3.58) compared to its level of motivation rated previously. Additionally, the 3D models received lower ratings, with a score of 3.83, ranking them among the least useful elements according to the participants.

What is notable about the data obtained from both the pre-test and post-test questionnaires is the difference in scores among students in the third section regarding the knowledge of the domain. In both tests, students were assessed on both their historical knowledge of the events of the 5th of November and the related vocabulary. The results of the pre-test revealed that the majority of participants (92%) were not familiar with the events of the story, while they also scored an average of 4.83 in vocabulary knowledge.

On the other hand, after exploring the topic in the VR prototype, 58% of the students reported feeling more familiar with the events of Bonfire Night, with an additional 25% noting a moderate level of familiarity. The most striking observation is the substantial increase in their historical knowledge, which significantly improved from an average score of 57% in the pre-test to 95% in the post-test. Similarly, their vocabulary skills demonstrated significant progress, with an average score of 77% in the post-test, compared to the initial score of 48% as reported in the pre-test.

The data mentioned above regarding the students' additional responses indicates that the VR prototype played a significant role in enhancing their understanding of the historical concepts and events related to the subject matter. A large majority of participants (92%) expressed their interest in exploring more VR applications in the future. Most users (83%) stated their willingness to recommend the VR prototype, "The 5th of November-Gunpowder Treason Plot," to their classmates and in the meantime, there was a notable preference for incorporating more VR applications in the EFL classroom setting.

Discussion

The study revealed that the virtual prototype had a positive impact on participants' knowledge and vocabulary. There was a significant improvement in participants' knowledge after engaging with the virtual environment. Through interactive activities and educational

content, participants effectively interacted with the subject matter and retained historical knowledge. This was reflected in higher scores on the "Knowledge of the Domain" section of the Post-test (Barbatsis et al., 2011). The participants' positive attitude towards the virtual space and its features, finding it motivating and rewarding, contributed to the scoring difference. Motivation and engagement are vital for student investment, and the prototype successfully met these requirements, enhancing knowledge and retention capabilities.

Regarding the participants' vocabulary levels, there was once again a notable score difference between the Pre-test administered before their introduction to the virtual environment and the Post-test conducted after they had explored the prototype (Cai, 2022; Hua & Wang, 2023). The environment ensured that the necessary vocabulary items were presented implicitly and explicitly, through both the glossary and the reading exercises integrated into the space. Referring back to the results indicating the participants' attitudes towards the virtual environment, it becomes evident that their strong interest and engagement while interacting with the environment ultimately had a positive effect on their comprehension of vocabulary as well.

Analyzing how students approached the VR prototype, an intriguing correlation emerged between their need for agency and the learning process. The initial plan was to guide students through a structured exploration, replicating typical classroom teaching conditions, where educators lead students through activities, present material, and allow sufficient time for understanding. However, as soon as the educators finished explaining the layout of the VR space and the educational objectives, students eagerly took the initiative to explore independently.

This rather intriguing results cast a new light on the significance of agency in the learning process and highlighted the benefits of promoting students' initiative in the classroom. Agency allows students to become active participants in their education and by having the freedom to explore and learn at their own pace, according to their preferred learning styles, they become more motivated and invested in the subject matter. This sense of control over their learning process encourages them to take responsibility for their own learning and embark on a learning journey where critical thinking, problem-solving skills, and a deeper understanding of the material are fostered (Brod et al., 2023).

Regarding the participants' attitudes toward the virtual prototype and its notable elements, the above results clearly indicate a preference for the embedded activities over strictly virtual features, such as the 3D models. Although the participants found those virtual elements to be motivating and engaging, as they captured their attention and piqued their curiosity, they did not consider them particularly useful for acquiring knowledge and retaining presented information. The same sentiment applies to the 3D labyrinth, which was specifically designed to add a playful element to the virtual environment. While the participants found it interesting, they did not perceive it as significantly contributing to the overall goal of the environment, which primarily focused on assisting them in acquiring necessary information in an immersive and interactive manner.

Conclusions

While VR implementation in education offers creative learning opportunities, it is essential to address certain limitations and concerns, particularly regarding the prototype's environment. Ensuring access to necessary digital devices like smartphones and tablets for all students is crucial, as is providing alternatives for those lacking the required infrastructure. A secure network is vital to maintain a seamless experience, as slow internet speeds can diminish the educational value. Familiarizing students and educators with the prototype's features prior

to classroom use enables proactive troubleshooting and support. During a pilot study, technical issues were encountered, and educators provided assistance through screen sharing and following students' instructions to overcome device and browser compatibility challenges. As far as the study itself is concerned, there are certainly limitations due to the small sample that participated and the limited time available for the execution of the prototype. In order to develop a more concrete picture of its benefits, the prototype should be tested with larger samples in the future and more functions should be developed and added over time, such as an in-game testing function, that will allow for immediate assessment and feedback.

The proposed prototype, showcases the potential of immersive learning despite it still being considered a novelty in the educational field, as the pilot study itself has shown so far. More specifically, the Artsteps platform still has a lot of unexplored potential that could lead to it being used as an educational aid for online teaching or even as a means to create immersive and interactive games to serve as testing grounds for student evaluation at the end of units or important lessons. As immersive technologies rapidly advance and their limitations lessen, it is reasonable to view them as a promising gateway to transform traditional education.

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