

A Social Virtual Reality Mobile Application for Learning and Practicing English

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Abstract—Many studies in the literature have shown that virtual reality (VR) applications will be one of the most sought-after tools in foreign language learning. This is due to VR's capability to keep learners engaged, motivated, and prepared with better communication skills in simulated virtual environments. As a result of the COVID-19 pandemic and social distancing rules, it became more difficult to use and practice newly learned language speaking skills with others in-person. This paper proposes a social VR mobile application called Language SVR which presents a set of various VR environments that simulate real-life situations to learn and practice the English language. The mobile application aims to improve English speaking skills by offering a private session with a native/fluent speaker tutor or a community of learners to practice speaking. It combines the benefits of mobile learning, social learning, and VR. Initial usability testing showed positive results. Several researchers explored the affordances of VR technology, and several existing industrial solutions lack the implementation of the Social VR concept for English language learning and practicing. This study fills the gap by introducing a practical and tested solution. It will contribute to the body of knowledge by defining the most sought-after skill by English learners, the emerging technology to satisfy the needs of language learners of this skill, and the required features needed in a social mobile VR application that address the difficulties faced by the English language learners. This paper found that applying VR technologies could contribute positively to language learning and improving learners speaking skills.

Keywords—virtual reality, mobile learning, social virtual reality, English language learning (EFL), educational technologies, covid-19

1 Introduction

English language skills and conversational fluency have become a prerequisite for success and advancement in many employment areas in today's world [1]. Accordingly, teaching and learning English has gained more attention, and many people are attempting to speak it fluently. The study of the mechanisms of language and speech abilities has shown that the most effective way to learn a foreign language is the method of

total immersion, where learners enter the native language environment; however, most people who learn the English language cannot live and study abroad [2]. Therefore, English learners face several issues in practicing the language; for instance, they have challenges finding native speakers and conducting conversations with them [3]. Also, they face difficulties memorizing vocabulary, which has a significant role in learning any new language [4]. In addition, some of them lack the confidence to talk to others, and some are afraid to be exposed to bullying by their peers when they make mistakes [5]. Although some learners know the vocabulary and rules of English, they cannot speak it fluently due to the lack of opportunities to use it either at home or among friends [6]. Some have difficulties dealing with native speakers, either in understanding or speaking like a native [7]. Thus, in Saudi Arabia, learners usually go to English language institutions to learn and practice the language.

The problem is that at the time of conducting this study, educational institutions remained closed due to the COVID-19 pandemic—that decision affected English language learners, preventing them from practicing the language in the real environment. Therefore, it requires more research on finding effective ways to enable learners to practice the English language in a virtual environment that simulates the real environment, especially under the exceptional circumstances like pandemics. Interestingly, a recent global survey showed that during the pandemic 70% of people spent more time with their smartphones or mobile devices [8]. This high usage and dependency on mobiles during this period would make learning through these devices a convenient option for many learners. Mobile learning [9], which is also known as M-learning, can be defined as a method of learning facilitated via mobile devices like smartphones, tablets to access learning content, ensuring that learning can take place anytime, anywhere, and at the learner's convenience [9, 10]. Thus, personalized learning, independence from time and place, cooperation between learners and teachers in both formal and informal situations, ubiquity and interactivity of mobile devices, are the biggest advantages of M-learning, and that is what makes it more efficient [9, 11]. It is possible to imagine the benefits of mobile devices in learning English. In the case of language learning, Mobile Learning is known as Mobile Assisted Language Learning (MALL) [12].

VR technology has caught the attention of researchers and industry pioneers alike, which has led to applying VR technology in various fields, including health, media, sports, entertainment, and, more importantly, education and training [13]. According to the Second Life concept founded by Philip Rosedale in 2007, establishing a virtual world has become commonplace, which offers an online space known as “Metaverse” for any person to explore a world parallel to the real world [14]. The term “Metaverse” refers to a world in which the virtual and real worlds are highly correlated [15]. The Metaverse's goal is to establish a realistic space, where people are represented by personal avatars, and offers users an opportunity to socialize, educate, entertain, and conduct business [14]. The metaverse idea is highly correlated to technologies such as augmented reality (AR) and virtual reality (VR) [16].

VR is described as the learning aid of the 21st century [17] and can bring significant changes in education on many levels, as it guides, motivates, and excites learners to accomplish their learning goals [13]. Learners can participate in the learning environment feeling present and as if they are a part of the environment [13]. Virtual Reality has

a three-dimensional (3D) computer-generated graphics environment, which needs to interact with devices. Thus, types of virtual reality are classified depending on the level of immersion and devices needed for interaction [18]. There are three types: (1) fully immersive, (2) semi-immersive, and (3) non-immersive. Fully immersive requires special devices such as a data glove and a VR headset [18] and using these devices allows the user to be part of the virtual environment by cutting out all outside information so that the experience is fully immersive. On the other hand, non-immersive uses only the mobile or desktop screen to interact with the user such as video games [18], where no special devices are needed and it is considered the least type of immersion [18]. Finally, semi-immersive falls between the two types because it uses a real prepared environment or equipment that is compatible and connected to a desktop screen to increase the level of immersion without cutting all outside information like the fully immersive [18]. The work presented in this paper follows the non-immersive approach.

As mentioned previously, due to the COVID-19 pandemic, changes have occurred in people's work lives and their communication due to health and safety concerns, resulting in a distance and remoteness from one another. People were unable to meet face-to-face and businesses were unable to hold meetings or conferences in-person. Many solutions were introduced to solve these problems such as VR as, particularly the concept of social VR to compensate for the social distancing required to prevent the spread of the virus. Social VR combines the concept of virtual reality and social learning as it allows multiple users from different places to interact, communicate, and socialize in a 3D virtual environment [19, 20]. For example, they can engage in a virtual environment such as classes, meetings, conferences, or even games.

Accordingly, by addressing the promising use of VR and the difficulties that face English language learners mentioned previously by studies, this research paper aims to enhance and facilitate learning and practicing English by creating a prototype of an interactive environment using a social VR mobile application called Language SVR that allows the learner to practice English in a set of VR environments that are difficult to be in in real life, especially during the COVID-19 pandemic. The proposed solution enriches learners' vocabulary which makes memorization easier for learners and helps in developing conversational skills, and the use of proper sentences depending on the context. Furthermore, it can help those who feel shy when talking to others face-to-face by providing a virtual social community of learners or native language tutors in the comfort of their own environment.

This paper contributes to the body of knowledge by answering the following research questions:

- What is the most sought-after skill by English learners, particularly during the Covid-19 pandemic lockdown in Saudi Arabia?
- How could emerging technologies be applied to satisfy the needs of language learners of this skill during lockdowns and/or social distancing rules?
- What are the features required in a social mobile VR application that address the difficulties faced by English language learners?
- In terms of design, does the proposed solution achieve an acceptable level of usability?

2 Literature review

2.1 M-learning in foreign language learning

Several studies shed light on the effectiveness of using mobile applications to learn foreign languages; for example, Zhang [21] presented a study that indicated the benefits of using the English Fun Dubbing application in learning English. The application “English Fun Dubbing” [22], contains various materials such as movies, animations, short videos, etc. The study showed that learning English through this application can provide flexibility and is user-friendly. This is not an isolated case as 90% of respondents were excited to learn English by using mobile applications as demonstrated in [23], where the study investigated the benefits of using the Telegram mobile application for learning English. The perception of participants of this study was that learning English via Telegram could be a promising and beneficial method for learning, especially vocabulary learning. Furthermore, another study [24] examined the relationship between the use of personalized smartphone applications and the learners’ performance outcomes in foreign language learning, especially English vocabulary and phrases. The result shows that the use of smartphone applications enhanced the learners’ performance and encouraged them because of the convenient content and immediate feedback received. The study also confirms that M-learning can be used as a complementary method in foreign language learning and teaching.

2.2 Social networks in foreign language learning

This section highlights the effectiveness of using a social and engaging environment for English language learning. Social networks are one of the well-known examples of an online social environment, which have introduced new ways of communication, sharing information and knowledge. In education, many schools, universities, and institutions worldwide use social network accounts to communicate, engage, exchange ideas, and share documents and information with their community. Studies [25], [26], and [27] believe that in addition to traditional teaching techniques, online social networks can improve teaching the foreign language by providing learners with real-world tasks for language learning and allow them to engage and communicate which can be better than traditional exercises. Social networks are also useful for learners as well as for teachers. According to Motteram and Sharma [28], they help students to learn more effectively by using the language in various contexts since social networks provide an engaging learning environment and bring together students from different places, cultures, and perceptions. Social networks also help students with various learning content forms such as photos, texts, videos, etc. Akbari et al. [29] as well as Harrison and Thomas [26] argue that social networks show higher student outcomes, higher motivation, interaction, participation, and feedback between students, their groups, and teachers.

2.3 VR in foreign language learning

In education, virtual reality is considered a powerful tool to enhance and facilitate learning [30] and enable the presentation of complicated data in an enjoyable and simple way [31]. One of the important features of VR is the students' ability to interact with objects in the VR environment [31]. Several studies indicated the effectiveness of using VR applications in foreign language learning. One such example, Al-Gamdi [32] points out that utilizing VR technology to teach English has differed from conventional learning techniques, where VR adds more excitement to the learning process and makes it more interactive and authentic. Moreover, Peixoto et al. [33] presented a study to evaluate the view of foreign language teachers around the benefit of using VR apps in listening activities, since listening exercises typically only use audio streaming and found that VR to be an attractive technology that motivates and helps students to listen to foreign languages within a virtual environment to understand and memorize what they have listened and seen to.

Another study [31] explored the effect of using a VR app for learning languages such as English called the *House of Languages* game to facilitate foreign language vocabulary acquisition and found that students who used this game were able to acquire new words better than other students who used the traditional way of vocabulary acquisition. In their article, Madini and Alshaikhi [34] explore whether VR headsets can help English for Special Purposes (ESP). Saudi female graduates participate in English terminology courses to retain vocabulary related to their field, where the results show that VR videos helped these graduate students retain ESP vocabulary, thereby increasing their proficiency. When looking at their opinions and attitudes after using VR headsets to learn ESP vocabulary, these graduate students were enthusiastic about using VR as an instruction tool in their ESP classrooms and also suggested employing it in other courses [34]. Their research [35] responds to calls for the use of "immersive interactive VR in ESP environments to provide mock-ups of real-life experiences to compensate for the lack of authentic ESP learning".

A study [36] conducted in Saudi Arabia using a questionnaire that covered various AI strategies and their appropriate applications for teaching/learning English, as well as the effectiveness of these applications, their practicality, and the requirements for using them, revealed a group of suitable AI strategies for teaching/learning English, but a very low level of actual use of these strategies for teaching/learning English. These strategies include interactive smart translation, communicative language teaching strategies and voice communication among others, and the teaching/learning of English requires the employment of strategies that have a high level of simulation and interaction.

2.4 Popular VR applications for foreign language learning

Some of the most popular VR applications for language learning known among Internet users are ImmerseMe [37], Mondly [38], and AltspaceVR [39]. Each of these applications is built for different purposes and has different characteristics as summarized in Table 1.

Mondly [38] is available for learning 33 foreign languages and uses computer-generated 3-dimensional virtual reality space and animated avatars to interact with the user. The user chooses a real-life situation to take part in a conversation with an artificial avatar which depends on speech recognition and predefined scripts. Furthermore, it includes reading, listening, and writing activities along with feedback on pronunciation and the user can use a VR headset or their mobile or desktop computer.

ImmerseMe [37] offers 3,000 different scenarios in 9 languages. The main feature provides users with real 360-degree videos of different places in the country of choice and makes users feel as if they were abroad and interacting with real people through a VR headset, mobile, or desktop computer. The learning modes are pronunciation, dictation, translation, and immersion with suggestions and feedback and like Mondly, the user interacts with an artificial avatar.

AltspaceVR [39] is a social VR application, which allows the user to start their own virtual reality space for live shows, meetups, and classrooms. This means users can invite others and interact with avatars of real users. These virtual spaces are not tailored only towards language learning; however, communities of language learners could meet in these virtual spaces to practice their languages and it is available on both desktop and VR headsets.

Table 1. Main characteristics of popular VR applications for foreign language learning

	Mondly	ImmerseMe	AltspaceVR	Language SVR
Purpose	Use gamification strategies and advanced technologies to learn languages in a fun, fast, and easy way	Allow users to virtually stepping into different beautiful and authentic locations to learn a language	Provide a virtual place to attend meetings, classes, events, and more with people around the world	Provide dedicated social VR application for English language learning which allows people around the world to interact, learn, and feel the real experience
Real-life situations	+	+	+	+
Instant feedback	+	+	-	+
Number of supported languages	33 languages	9 languages	Not specified	English language
Suggest compatible sentences and vocabulary	+	+	-	+
Type of character the user interacts with	Artificial avatars	Artificial avatars	Avatars of real people	Avatars of real people
Number of users to interact with	One-to-one conversation	One-to-one conversation	Many (Social VR)	Many (Social VR)
Unrestrained conversation context	-	-	+	+
Available on	Desktop, mobile, and VR headsets	Desktop, mobile, and VR headsets	Desktop and VR headsets only	Mobile

This study reviewed both academic research and existing VR industrial solutions. From the academic perspective, the use of VR in language learning is not a fully explored field of research [40]. Several researchers explored the affordances of these less familiar technologies where this study fills the gap by introducing a practical and tested solution [41, 42]. Additionally, there is an urge for research on mobile learning to improve learners' achievement, motivation and engagement [43]. From the reviewed VR solutions, this Language SVR application for leaning and practicing English offers different features to bridge the gaps found in these applications. Language SVR is a Social Virtual Reality mobile application that combines the benefit of M-learning, social learning, and VR used specifically to learn English, which is not found in any of the applications discussed in Table 1. AltspaceVR is the only social VR application among them, which is not dedicated to English language learning, thus combining the social VR feature from the AltspaceVR application and English language learning applications' features from Mondly and ImmerseMe could fill many gaps. Language SVR application dedicated to English language learning, which provides instant feedback about learners' skills, and suggests sentences and vocabulary that can be used during the conversation. Using the social VR in the proposed solution allows people to interact and learn with many different people in different VR environment that is difficult to be in during the COVID-19 pandemic and social distancing guidelines. Furthermore, the use of social VR and avatars of real people is because learners show a drop in interest because of the lack of affections, connection, and more flaws compared to real people [44]. This will also help to have a more diverse and open conversation context.

3 Methodology

The proposed solution is a mobile application that uses social VR for learning and practicing English, which helps learners know how to use the language effectively and enjoy the real experience by providing VR environments that are difficult to find, especially with the COVID-19 pandemic social restrictions. The application combines the benefits of M-learning, social networks, and VR in the language learning process, and the purpose is to provide different VR environments that simulate real-life situations to enable learners to connect and communicate with real people whether in a private session or a community that can be accessed anytime anywhere via mobile. Virtual communities gather different learners and tutors in the same VR environment of their choice, such as a mall, restaurant, job interview, or hospital and allow them to roam inside and have conversations with each other. The private session provides the same VR environment options but with a one-to-one conversation between learner and tutor.

The waterfall model was selected as a methodology for this application due to the well-defined requirements at the beginning of the development, the short time of the development (since only the design of the application is proposed), and the minimal user engagement required which was only in the data collection and testing phase [45]. Based on the waterfall model, the phases of the user interface (UI) prototype will be definition of requirements, design, implementation, testing, and maintenance. Briefly, in the first phase, related works, questionnaire, and popular existing VR applications

are used to define the requirements. For the second phase, ThingLink¹ and Proto.io² software was used to design and simulate the application UI. The last phase includes usability testing and maintenance of required modifications. Each phase will be discussed respectively in detail in the following sections.

3.1 Application UI requirements definition

In the first phase, to define the requirements', related works were surveyed to find the gap and highlight the need for this kind of application. Additionally, existing similar applications were investigated to define the missing features and the contribution of this study (Table 1). Lastly, a questionnaire was distributed to define the highly needed features and skills as perceived by users.

Data collection. The data collected was based on a questionnaire published online using Google Forms and distributed through *WhatsApp*, *Twitter*, and *Telegram* and aimed to understand the obstacles and difficulties that English language learners face and determine the age group with the most need for applications to practice their second language. The sampling technique is simple random sampling [46]. The questionnaire was available for a limited period of two weeks, which began on February 22, 2021, and the questions were formatted as closed-ended, multiple choice questions to facilitate quantitative analysis of the data. Some questions had an option to add more comments, while others allowed more than one choice due to the potential for more than one answer to be applicable. The questionnaire involved 519 participants and the age groups were categorized based on the educational level: primary, middle, and high school, undergraduate, and postgraduate university students. A limitation of the study is that similar to several social science studies, it relies on self-reported data which was discussed extensively by researchers [47, 48]; however, anonymity was declared at the beginning of the questionnaire to minimize this issue. The test-retest method was used to ensure the validity and reliability of the questionnaire, which measures the stability of results when you repeat the same test at a different point in time [49]. The questionnaire was redistributed at a later stage and confirmed the stability of the results.

According to the questionnaire results, the participants were 379 females and 140 males, of which 41% belonged to the 24–35 age group, 25% belonged to the “36 and above” age group, 19% belong to the 19–23 age group, 15% belonged to the 13–19 age group, and the participants from the “less than 13” age group were just one person with a rate of 0%. Most participants from each age group had an intermediate level of English language level. Most participants who belonged to age groups of “19 and above” faced difficulties in speaking skills, while the age group “13 to 18” faced difficulties in writing skills, as shown in Table 2. In addition, when participants conducted a conversation, 32% faced difficulty remembering appropriate vocabulary and sentences, while 25% of participants faced difficulties due to a suitable environment's unavailability for practicing the language and 25% faced difficulties due to their limited English vocabulary. Some participants added that they faced bullying while practicing the language, with the majority thinking that not practicing and speaking the

¹<https://www.thinglink.com/>

²<https://proto.io/>

English language leads to forgetting it and more than half of the participants found that finding native English speakers in their environment was difficult. Interestingly, 84% of participants liked the idea of using a VR application for English language learning; however, 80% of them did not own a VR headset.

Table 2. The most difficult English skills for each age group

English Skills	Age Group			
	13 to 18	19 to 23	24 to 35	36 and Above
Writing Skill	37%	31%	35%	30%
Reading Skill	13%	14%	14%	11%
Speaking Skill	35%	38%	39%	45%
Listening Skill	15%	17%	12%	14%

Requirements’ analysis. The following requirements were defined based on the questionnaire results, where were analyzed using Microsoft Excel. The target user age is 13+ years old as they show the most interest in learning and practicing the English language. The focus of the Language SVR mobile application is on improving conversational and speaking skills which are considered the most difficult skills for English language learners, as they tend to forget the language when not actively using it, especially through speaking. Most of the respondents cannot find native speakers and this is where the private session feature differs as it provides learners with tutors who are native speakers. When it comes to conversational skills, respondents find the most difficult thing is to find suitable environments to practice speaking the language, lack of vocabulary, and tendency to forget structures, or difficulty in forming suitable sentences for the situation. The mobile application provides sentences and vocabulary relevant to the chosen VR environment as a suggestion, but the VR type used is non-immersive because most of the learners do not have a VR headset.

In comparison with VR applications illustrated in Table 1. Additional requirements were defined to combine beneficial features from each application. Tutors and learners are real people; therefore, the application does not enforce any restraints on the conversational context and the learner can get instant feedback about their performance and the application only supports learning the English language.

The instant feedback from the tutor to the learner must be based on specific English language assessment criteria. Knight [50] defines eight assessment criteria for English speaking skills which are: grammar, vocabulary, pronunciation, fluency, conversational skill, sociolinguistic skill, nonverbal, and content. Using all eight assessment criteria will take time, and since one of the main objectives of the application is to save users’ time, the assessment criteria in the Language SVR application was narrowed down to the most important four, which are as follows:

- Vocabulary: range and accuracy. Range includes breadth that refers to how many words a person knows and depth that refers to how well a person knows these words [50].
- Pronunciation and Fluency: individual sounds, stress and rhythm, intonation, smoothness, speed of talking, and hesitations [50, 51].

- Grammar: range and accuracy [50].
- Conversational skills: topic development, initiative, cohesion, and conversation maintenance (clarification, repair, checking, pause fillers, etc.) [50].

3.2 Application UI design and implementation

The learner's view. The *learner homepage* contains two options: Join Community and Private Session; as shown in Figure 1, and the learner can select one of them to start learning English. When the learner selects Join Community, a list of available environments is displayed and the role he/she wants to play in that environment will be selected, as shown in Figure 2. For instance, in a restaurant VR environment, the user can choose to play the role of a chef or a client. On the other hand, when the learner selects Private Session, a list of private environments is displayed, which the learner can choose from and select his/her favorite tutor if available, or any available tutor then sends an invite, as shown in Figure 3. Once the invitation has been accepted, the learner can start the conversation with the tutor and when the session ends, a rating page will appear to allow the learner to rate their experience with the tutor.

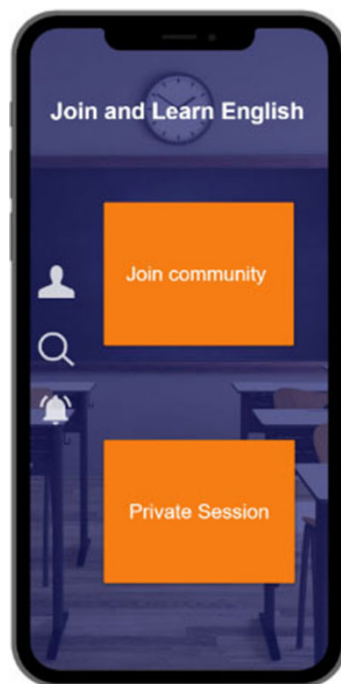


Fig. 1. Learner's homepage

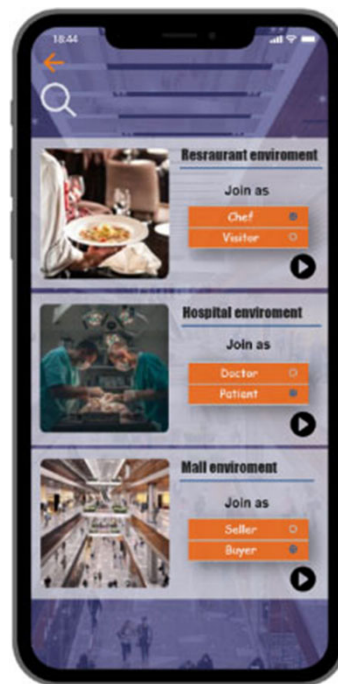


Fig. 2. Join community page

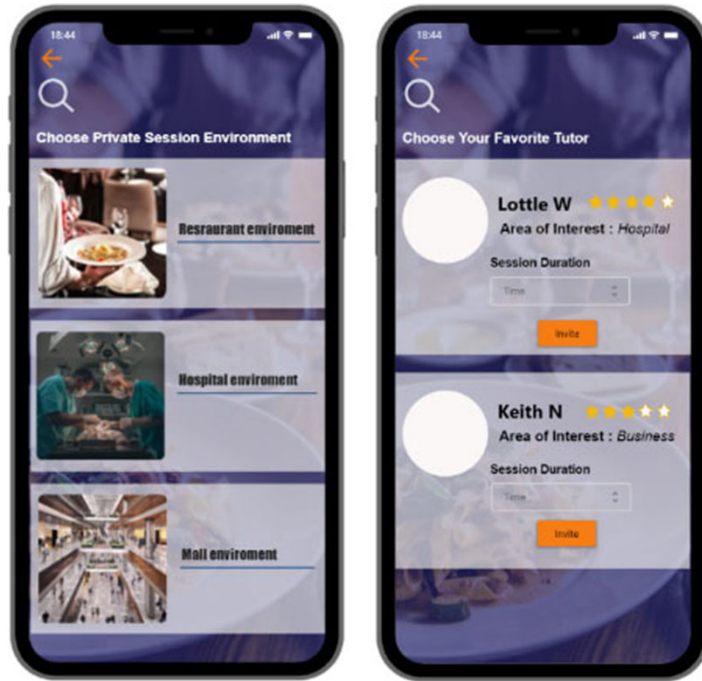


Fig. 3. Private session pages

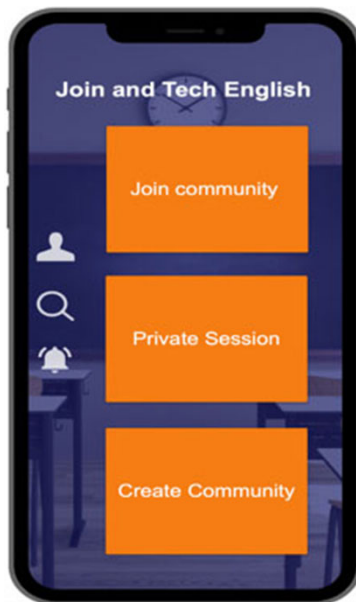


Fig. 4. Tutor's homepage

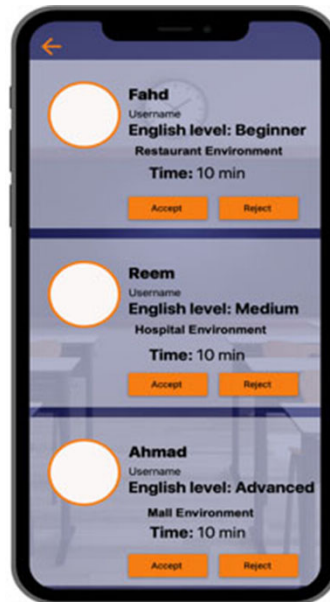


Fig. 5. Private session invitations

The tutor's view. The *tutor homepage* contains three options, as shown in the Figure 4, where the tutor can select one of them to start teaching English. First, when the tutor selects a VR community, a list of available communities is displayed (similar to the learner's page in the Figure 2) and they can select the community and the role they want to play in that community. For example, in a shopping mall VR, the tutor can choose to play the role of a buyer or a seller. Second, when the tutor selects a *private session*, requests for private sessions that the tutor has received from learners will be displayed, and he/she can accept or decline them (Figure 5). The session VR environment will depend on the VR environment chosen by the learner and when the session ends, a feedback page will appear to allow the tutor to assess the learner's level depending on the discussed criteria in section 3.1 which are Vocabulary, Pronunciation & Fluency, Grammar, and Conversational skills along with additional comments. Finally, they can create a VR private community, after which the tutor can invite learners that he/she is following as shown in the Figure 6.

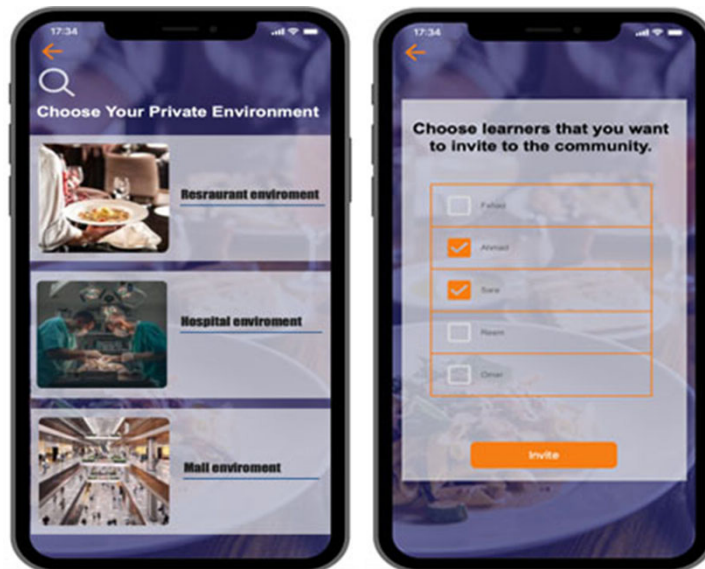


Fig. 6. Creating community and inviting learners to the created community

The VR environment. There are many predefined VR environments that can be chosen by learners and tutors. When joining or creating the VR community environment, many features are embedded in it. For example, at the veterinary clinic, as shown in Figure 7, users can hover and click on any object in the environment to see its name which helps in the acquisition of new vocabulary (Figure 8). Furthermore, common phrases that relate to the veterinary clinic VR environment will be provided to help

users use proper sentences as shown in Figure 9. Then users can speak and have a conversation with anyone that joins the VR environment with them, see their profile, and follow them if they wish to do so (Figure 10). These are the same features provided in the VR private session environment, except it is a one-to-one conversation between tutor and learner.



Fig. 7. The VR Environment

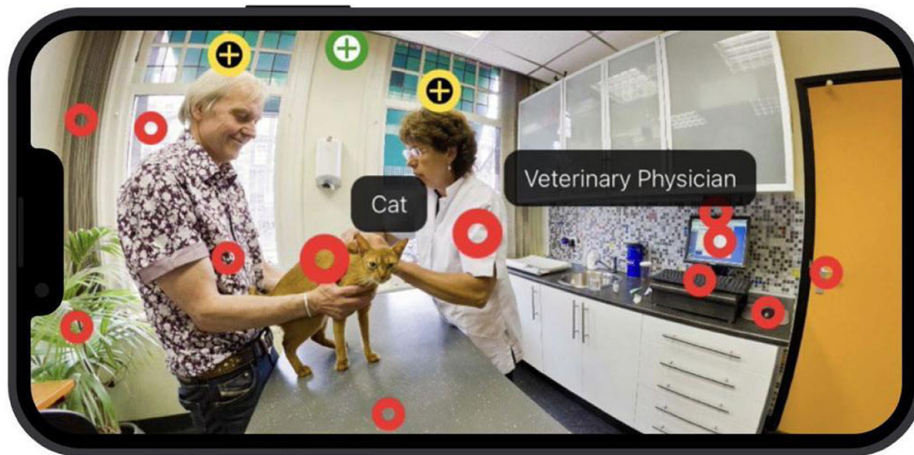


Fig. 8. Vocabulary in the VR environment

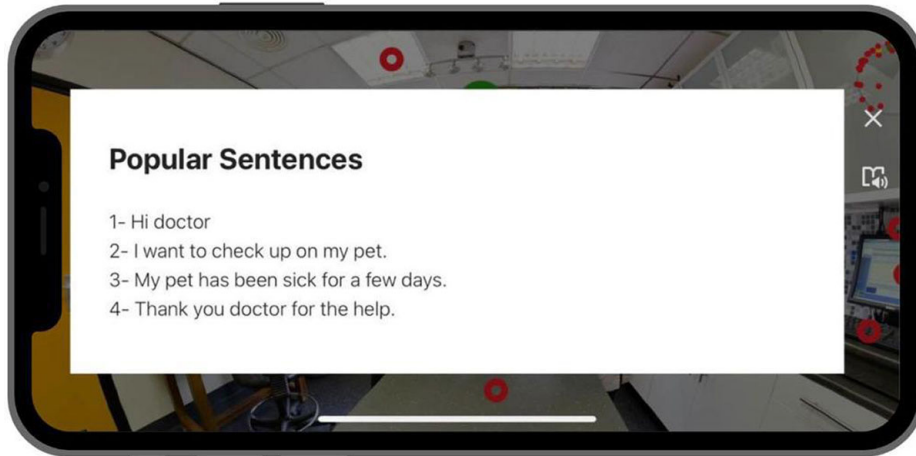


Fig. 9. Common sentences/conversations in the VR environment

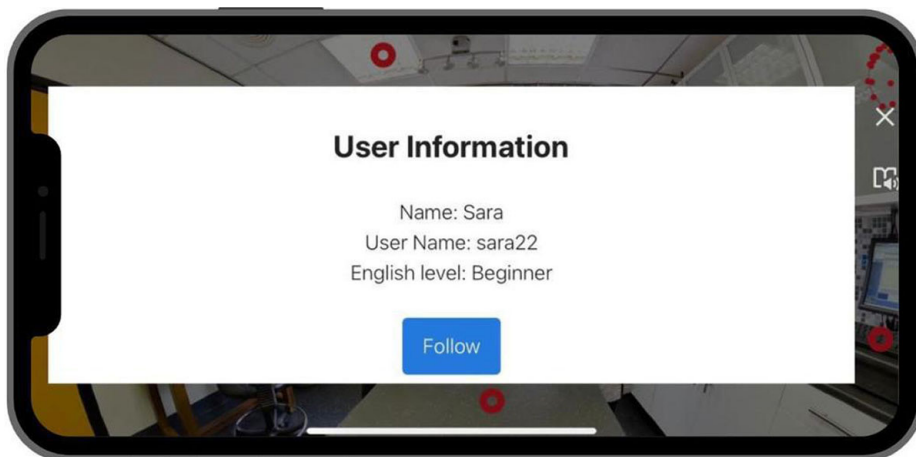


Fig. 10. User Information in the VR environment

3.3 Application UI testing and maintenance

In this section, the aim is to assess whether the application is suitable for all users of different age groups and maintain any modifications required after the assessment. Usability testing will be used which is testing if the application is friendly and easy to use from the users' perspective. It can be used for application user interface prototypes to discover design problems and find solutions [52] and is done by observing how the users interact with the user interface prototypes [52]. Due to the Kingdom of Saudi Arabia's efforts to limit the spread of Covid-19, including the closure of schools and

universities, there were some difficulties in reaching a large sample of participants for this test. Under these circumstances, the focus was on attracting at least 2 participants from each age group.

Table 3. Usability testing result

Usability Heuristic	Heuristic Explanation	Result
User control and freedom	Easy pages navigation and clear exit points	70% found it easy to navigate through pages 30% found some missing exit points
Consistency and standards	Clear and consistent use of words and icons with no confusion about their meaning	80% found it clear and consistent 20% confused about some icons
Aesthetic and minimalist design	Simple design with relevant information and visibility of each element	100% found the design simple

As a result, participants were then contacted online and some (n=10) participants who were interested in learning and practicing English expressed interest in participating in the experiment to test the prototype. Approximately 2–3 participants from each age group were selected as shown in Table 2. The test took five hours, where each participant took about 30-minute to complete the test. Nielsen [53], introduced 10 usability heuristics, 3 heuristics chosen to be tested in this paper which are user control and freedom, consistency and standards, and aesthetic and minimalist design. Only 3 heuristics were chosen due to the time constraint of this study, plus from the authors’ perspective, these were the most relevant heuristics to be tested on the proof-of-concept version that does not represent the whole application. Table 3 summarizes the result of the testing. For the first heuristic, some problems were found in exit points and back buttons and the problem was solved by adding more back buttons to give users more control. In the second heuristic, the notification icon was changed due to user confusion and thought it was a chat icon. However, all users found the design friendly, simple, and easy to use in the last heuristic. In general, users enjoyed using the application and found it interesting to discover each feature.

4 Discussion

This study started by attempting to answer the research questions in the introduction and illustrate the design of a social VR mobile application for learning and practicing the English language. The distributed questionnaire answered the first question which found that the most sought-after skill in learning English is speaking which is the main focus of the proposed solution. Previous studies have established the benefits of using Metaverse and VR in language learning, and both the literature and the questionnaire results show users’ interest in using VR mobile applications, which in turn answers the second research question. Therefore, the mobile application helps English language learners by providing appropriate VR environments to practice the skill they need the most. For the third question, through reviewing the literature and the proposed solution

and the questionnaire, the required features were identified to solve the difficulties faced by English learners as illustrated in section 3.1. The proposed solution was found to be easy to use, consistent, and simple as described in section 3.3 which addresses the last question.

By answering these questions, this paper contributed to advocating the need for VR mobile applications to learn and practice the English language during the pandemic and take into consideration learning within a context and without additional tools. Interestingly, when the questionnaire was redistributed after most of the pandemic restrictions were lifted, English language learners still stated that they had difficulties in improving their speaking skills, remembering appropriate vocabulary and sentences, and finding a suitable environment and native speakers to practice the language with. This supports the generality of the result whether during times of a pandemic or not.

The proposed solution is suitable to be used by English teachers and as a supportive tool for self-learning and practice. Creating a virtual private community is an opportunity for English language teachers from schools, institutions, or universities to create a VR environment with their in-class students and send invitations to them by using their usernames, which will enhance faster feedback from teachers, which in turn leads to improving their performance, motivation, communication, and collaboration [33]. The information regarding students' English language level and skills provided in the SVR application could assist educational experts to understand students' needs, thus helping to customize the learning material, enhance the learning process, and adjust the assessment methods [54, 55].

This work will help improve the possibility of finding fluent speakers to practice language with and improve speaking skills. However, the authors are aware that this study might have limitations which are: (1) Difficulty to attract many tutors to register for the application. (2) Some tutors might not have knowledge of this type of application and find it difficult to use [56]. (3) The application has not been developed to assess the real impact of the application on English language learning and teaching, and user interface usability testing was limited to 3 heuristics and 10 users due to time constraints and Covid-19 social distancing and restriction rules.

5 Conclusion and future work

The intention behind conducting this study is to provide English learners with virtual reality environments which are like real environments to practice English whenever and wherever they are. The research showed that English language learners had difficulty finding native/fluent speakers to develop and practice the new language with, particularly in times of a global pandemic. They also faced difficulty remembering vocabulary due to not practicing it daily and fear of bullying when making mistakes speaking English in front of people. Therefore, the paper proposes a social VR application to practice the English language with native speakers or other learners in different virtual reality environments such as hospitals, malls, and restaurants. The social VR application will assist learners in developing their speaking skills by offering them two options, either entering a VR private session with a native/fluent tutor, after which the tutor gives them feedback on their speaking performance using specific criteria.

The other option is joining a VR community, speaking with other learners, and acquiring language vocabulary and sentences most used in a particular environment. The user interface was designed upon functional requirements defined based on analysis of the users' needs via a questionnaire. Initial evaluation showed that the application is simple and easy to use, although some design issues were discovered and resolved during pilot testing. Finally, this type of social VR application tool could also be used by formal educational institutions as supplementary to teaching and learning a foreign language. For future work, further evaluation with greater number of participants should be conducted and evaluated.

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