

Virtual Reality English Language Tool

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ABSTRACT

A presentation of Virtual Reality English Language Tool, an immersive language practice experience developed in Unity for the Oculus Platform.

Author Keywords

Virtual Reality; Language Learning; Immersion; English; Education; Simulation-Based Learning

INTRODUCTION

Since being rejuvenated in 2010 by Oculus Kickstarter, Virtual Reality (VR) as a technology has received lots of attention. Companies such as Google, Apple, HTC and Facebook have invested many resources into this new frontier hoping to uncover the full potential of this unique application. Once thought of as another medium for gaming, developers have found and continue to research new ways to utilize this application. One area looking to leverage Virtual Reality's immersion qualities is education. Medical education has already successfully tapped into VR's immersion capabilities to train aspiring doctors and surgeons [2] [18]. In this project, we look to leverage VR's immersion qualities to enhance *English Language Learning*.

Due to globalization, the world is "shrinking" and the need to communicate cross continent is becoming more important. In the early 2000's, the European Commission, understanding the importance of multilingualism, drafted the *Commission of the European Communities Promoting Language Learning and Linguistic Diversity: An Action Plan*. This document laid the framework for English education in Europe as it stands today [4]. Also recognizing the importance of multilingualism, Asia poured many resources into promoting English learning [19].

There is a desire to learn English globally however the best method to teach language is still a topic of discussion. Asia's approach to language acquisition emphasizes textbook learning, memorization and drilling [19]. This has resulted in Surface Learning and low proficiency in English as evidenced by *English First (EF) Global English Proficiency Index*, which rates Asia as a continent as predominantly Primary Level English [5]. Europe employs a method known as *Content and Language Integrated Learning* (CLIL). CLIL as described in *Teaching and Learning English through Bilingual*

Education is an umbrella term for bilingual education and the basis of this education approach is core subjects being taught in the second language [1]. Second language becomes the vehicle for instruction. In other words, CLIL attempts to replicate authentic language learning/acquisition through Language Immersion. The effectiveness of this method often lies with the instructor's experience and whether or not a student has access to bilingual education [1].

Additional research relating to general language acquisition further reinforces the effectiveness of CLIL teaching methodology. Language learning is most natural and easiest to do when we are young. The reason for this is because our brains are malleable and can absorb more [11]. Despite being empty canvas' we are able to acquire language easily without any formal instruction. The reason for this relates back to Social Learning and Immersion [3] [15].

Research in Social Learning discusses the idea that humans grow up learning through observation. It is the idea that by being immersed in an environment; we are able to pick up things from our surroundings. Humans observe things like parents, TV, etc. and attempt to replicate them. Decisions to continue to perform imitated actions are dependent on reinforcement, which come in the form of parental approval/disapproval or physical feedback (pain, etc.) [15].

In the context of language acquisition, children listen, attempt to replicate, make mistakes and adjust. Language acquisition done in this way is more effective and organic resulting in *Deep Learning* (comprehension of material) [6] [7] [10].

The issue with Immersion based language acquisition is its accessibility. Bilingual education is not readily available and requires special methods of instructions that instructors may not have. Virtual Reality, which leverages immersion, offers language learners and instructors with a tool that accelerate English proficiency. This is done through experiencing authentic interactions and feedback in a simulated environment.

RELATED WORK

Since Virtual Reality is a relatively new technology in education, there are not a lot of applications that exist that support language learning. VR education is still a largely

unresearched area. Despite this, there are a few applications that exist: ImmerseMe and Mondly.

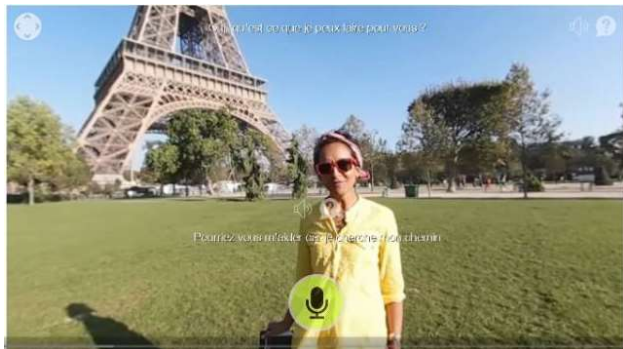


Figure 1: ImmerseMe VR Language Application

ImmerseMe is a VR application that has launched its Desktop application in 2017. The application takes users to beautiful, authentic locations in the world. The user will be immersed in the environment (taken by 3D video) and have an opportunity to interact with store clerks with text-based prompts and listen to proper pronunciation of the language they are learning. Current languages being offered include: German, Spanish, French, English, Japanese, Chinese, Italian, Greek and Indonesian. Mobile and High Immersion headsets platforms will be released in 2019 [20].



Figure 2: Mondly VR Language Application

Currently out on the Oculus store, Mondly offers 28 different languages to learn on a wide range of platforms. Environments are created from 3D models and interactions are text-based prompts. Conversations feature text-based prompts, and authentic events like conversations on a train or at a restaurant. The technology utilizes Chabot technology to emulate more organic conversations. This application is currently has over 700 reviews but as expected with newer ambitious technology still requires some improvements [16].

IMPLEMENTATION

Technologies such as ImmerseMe and Mondly assume a certain baseline proficiency in the language. Learners without this baseline knowledge will not be able to use the application effectively. Additionally, text-based

prompts are not organic or natural. Not only in real simulated life are there no predefined answers displayed on the screen for you, it lacks the important listening-learning aspect of language acquisition described in research and Social Learning.

The objective of this Virtual Reality Language Learning Application is not to create a cliché game that incorporates language and immersion. We want to avoid limiting VR to just a motivator to learn [17]. The main goal is to leverage the immersion aspects of Virtual Reality in order to recreate organic language acquisition.

In order to leverage the Immersion aspect of Virtual Reality for Language Learning, we must try to replicate the feeling of observing a scene play out much like we would do as a child observing our parents interact. Following this act would be the users attempt to replicate what was observed and heard in order to perform the action. Mistakes will most definitely happen and will be tolerated and encouraged, as outlined in CLIL teaching methodology [1]. Following that is adjustment. This type of immersive Virtual Reality Language Learning experience replicates the organic language acquisition young children go through when they are first learning to talk outlined in research. Users will be able to practice language first hand in a simulated environment and achieve Deep Learning.

For the VR English Language Tool, the focus is to create one (English) language immersive environment. The user will put on the VR headset and be transported into a virtual environment. Users will have the opportunity to watch a short fast food restaurant order scene. The scene will include various types of customer-employee interactions. Users may view the scene as many times as they like and can supplement this observation session with an interactive object scene where they can listen to key vocabulary. When comfortable, the user will be given the opportunity to practice what they observed by navigating a virtual fast food restaurant where they can interact with a Non-Player Character (NPC) to order food.



Figure 3: Development of VR Language Tool using Unity Game Engine

VR English Language Tool was developed using the Unity game engine for the Oculus platform. Oculus SDK, VRBasics package and various Unity Asset Store environment assets will be used to create this application. Additional application functionality, such as Scene Management, 3D Virtual Player will be created utilizing C# scripts

Home Screen

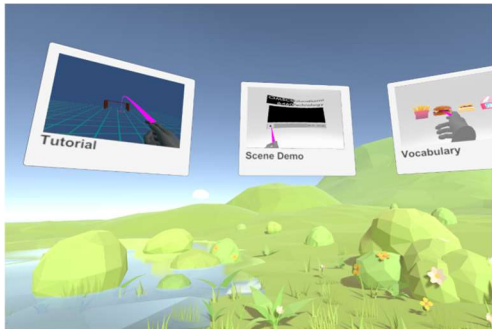


Figure 4: Home Screen with options (Tutorial, Demo, Vocabulary, and Practice)

Virtual Reality applications tend to have an inviting and immersive home screen. The purpose of the home screen is to give users a sense of immersion at the very beginning. For my application, I chose a simple nature scene as the setting for the Home screen. The home screen is equipped with a menu containing four options: Tutorial, Demo Scene, Interactive Vocabulary, and Practice.

Since we are creating an English language VR application, we must assume that users will have limited language skill. To compensate for this, menu items are described using images instead of written instructions. The images give users a preview of that particular option. The design decision to include no direct written instructions is two-fold, as the application encourages users to be curious and explore on their own, which is a key aspect of organic language acquisition.

Tutorial

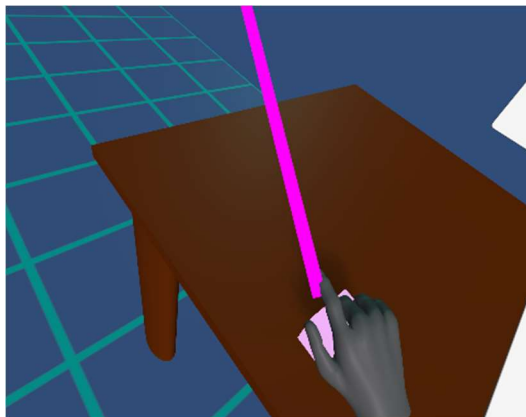


Figure 5: VR grab mechanic in Tutorial Section

For the user to get the most out of the VR language learning experience, they must have the proper learning mindset. Organic language acquisition through observation (like when we are young observing our parents talk) is much different than the types of learning we are accustomed to in school (practice/drilling). The tutorial, though trivial, has a very important purpose of forcing users to observe and pay attention to details in order to even utilize the application. The tutorial will teach users the following: VR movement (teleportation), UI interaction (pointer), VR interaction (grabbing objects).

All instructions are conveyed through figures and diagrams. Users will need to carefully look at the diagrams and experiment/struggle with the implementation. Organic learning happens slowly and with struggle and mistakes. Starting early with the tutorial sets up the expectations for the type of learning that users will be experiencing. There will be experimentation and mistakes but it is ok because eventually they will figure it out and be proficient.

Scene Demo

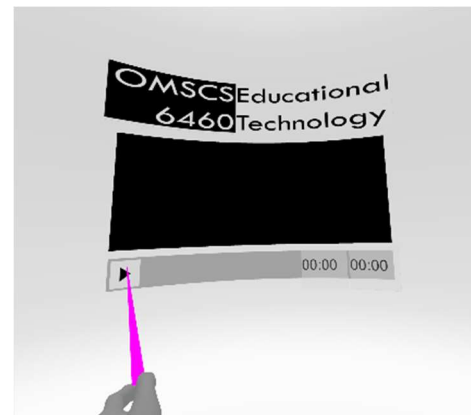
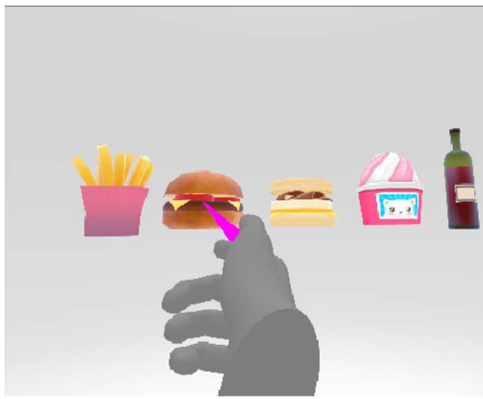


Figure 6: Virtual Reality Scene Demo with Virtual Video Player

The first step to organic learning acquisition is observation. Here we simulate this by having users watch a common conversation that happens at a fast food restaurant. Users view this with a video player in Virtual Reality. They have free control over the player (playing/pausing) and may watch the scene as many times as they want. Ideally they will pick up on the language used and attempt to recreate what they observed in the practice scene.

Vocabulary Interaction



uFigure 7:

Interactive vocabulary scene allows users to point to 3D objects and listen to pronunciation

In order to assist learners, a vocabulary interaction scene is included where users can use their virtual pointer and click on 3D objects and hear the pronunciation of the words. Sometimes, conversations happen very quickly. This section is meant to provide users with a space where they can reinforce their vocabulary and their pronunciation. This also gives users the freedom to explore more and learn key vocabulary at their own pace.

Practice Scene



Figure 6: Immersive experience: Users can move about scene and interact with Non-Player Character (NPC)

The culmination of all the previous sections is the Practice Scene where users will attempt to recreate the conversation and utilize vocabulary from scene demo and vocabulary interaction. The experience is immersive as Users can travel around the virtual Fast Food restaurant and interact with the items in the scene. The most important portion of the experience is the interaction with the cashier. Users will have the opportunity to order fast food items like done in the scene demo. The NPC will respond according the user input. This is experience gives users with practice that replicates real world scenarios. The portion of the VR application is the culmination of immersive language learning.

The speech recognition system utilizes the Speech Manager Script provided in the VRBasics asset package. The script works to identify keywords spoken and record them on the onscreen GUI. Utilizing this keyword identification, NPC response that mimic interactions from the demo scenes were constructed.

LIMITATIONS

Development

The main limitations to the development of this VR language application are time, money and experience. The work done on this project was completed by an inexperienced developer over 8 weeks. The non-player character (NPC) interaction system can be improved to create more dynamic responses instead of pre-scripted responses. The more believable the interactions are in this language tool the more immersive and effective the learning can be. If this application had the attention of a few more experienced developers, the application will have greater potential.

Adoption

An additional limitation for this tool is adoption. This tool requires users to have a VR headset and a computer with compatible specs. With the high prices of these items, it may be difficult for individuals and educational institutions to acquire the pieces necessary to run this application. A possible solution to this problem would be to port the application to mobile platforms making it a more assessible tool. The drawback to this approach is the experience would be less immersive as mobile platforms are more limited.

Language Learning

There are many aspects of language acquisition: speaking, writing and reading. The VR English Language Tool emphasizes speaking as it leverages key aspects of social learning and immersion in order to create authentic speaking environments. It does not however include anything that would promote reading and writing proficiency. If a user needs to improve their reading and writing, they will need to utilize another tool.

CONCLUSIONS

There is a demand for multilingualism in the world. The challenge is figuring out an effective method for language acquisition. Traditional methods of instruction utilizing textbooks and memorization have proven to be ineffective at fostering learning. Content driven language immersion experiences are effective but only assessible through bilingual education and trained instructors. Virtual Reality provides language learners with accessible language immersion experiences.

In its current form Virtual Reality English Tool has the potential to enhance English language learning. Providing learners with a way to practice their spoken English in

authentic, immersive, simulated environments will improve English proficiency. In the long term, VR English Tool, and its approach to replicate the organic language acquisition young children go through when they first learn to talk, can promote Deep Learning and change language instruction as we know it.

FUTURE WORK

Additional language demos need to be added along with corresponding 3D environments before the Virtual Reality English Tool is ready for production and distribution. Improvements to the Non-Player Character (NPC) interaction needs to be made to enhance the immersion. In its current form, pre-scripted responses can break conversation immersion when an unexpected response is given by users. The NPC interaction can benefit from a high functioning Artificial Intelligence that functions similar to a chatbot.

Enhancements to game environments can make experiences more authentic and immersive. Current 3D environments are created with low-poly assets which are pleasing to the eye and good for application performance but clearly not real.

The Virtual Reality English Tool can also benefit from more testing and surveys to see if users are getting the social learning experience that the application aims to recreate. Feedback from these studies can be utilized to improve the overall experience and effectiveness of the tool.

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