

LEARNING BOUNDARIES:

An immersive virtual environment with a conversational tool to help individuals practice and learn verbal consent

by: Preeti Mahajan



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A thesis presented to OCAD University in partial fulfilment of the requirements for the
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Abstract

Consent is crucial in establishing boundaries and respect for personal autonomy. It is an essential concept in legal and social contexts, becoming increasingly relevant in recent years. It is commonly understood as an agreement between two or more people for something to occur. Depending on the context, it may be necessary for activities, interactions, and medical procedures. This research explores using an immersive virtual environment as a tool for experiential learning approaches to help users learn and train themselves in verbal consent scenarios. The study examines and explores related concepts using research through design methodology and looks at the effectiveness of using Virtual Reality (VR) as a technology for the user to learn about verbal consent via scenarios in an immersive environment. VR can facilitate the sense of embodiment for the user. This research allows users to interact with a non-playable character to practice and learn about consent, without judgment.

The effectiveness of using VR as a learning tool for consent was evaluated through research through design methodology and user testing, utilizing a quantitative data analysis approach. Pre- and post-experiment surveys were administered to assess the experiment's effectiveness, and the collected data was synthesized and analyzed to comprehend the research outcome.

Keywords: Immersive virtual environments, consent, conversational agent, experiential learning, embodiment, interactions, non-player character

Acknowledgement

The land on which this research was carried out is the traditional territory of many nations, including the Mississaugas of the Credit, the Anishnabeg, the Chippewa, the Haudenosaunee and the Wendat peoples and is now home to many diverse First Nations, Inuit and Métis peoples.

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Chapter 1: Introduction

There has been an increased focus on the importance of consent due to changing societal norms, legal frameworks, educational initiatives, and the #MeToo movement¹. This recognition is based on respecting individuals' autonomy and boundaries, leading to a greater understanding of verbal consent's role in ensuring that all parties involved are comfortable and enthusiastic about engaging in any activity. However, verbal consent is only sometimes accessible for various reasons, including power dynamics, language barriers, cultural norms, fear of repercussions, and lack of understanding of what is being consented to. Many people need help to ask for it or gauge whether the other person is enthusiastic about engaging in the same activity. This research combines studies and reviews of consent frameworks from teaching, legal, and using virtual reality (VR) Oculus Quest 2 as a tool for education, literature in the context of verbal consent scenarios: affirmative consent is voluntary, informed, revertible, specific, and unburdensome (Im et al., 2021).

With the help of a high-fidelity virtual reality system, 'Boundaries', the learner interacts and experiences a three-dimensional virtual environment that provides real-time visual and auditory feedback. VR has helped create rich learning experiences as the learner is technically immersed, making it possible to create a unique and impressive learning system (Piovesan et al., 2012).

¹ <https://metoomvmt.org/>

Affirmative consent is the idea that someone must ask for—and earn—enthusiastic approval before interacting with another person (J. Val et al., 2008). Sometimes referred to by the shorthand, "yes means yes," (Im et al., 2021). Affirmative consent is, at its core, a precursor to interpersonal interaction designed to ensure agency and positive outcomes (Im et al., 2021). This research uses the theoretical consent framework of Affirmative consent to explore An immersive virtual environment with a conversational training tool to help users learn about consent.

Virtual Reality (VR) is quickly becoming an increasingly powerful tool in education, healthcare, and engineering (Mulders et al., 2020). Virtual reality technology has several features that can potentially enhance education. Some of these abilities include the capacity to enable students to visualize and interact with a three-dimensional virtual representation through roleplay by giving them a different body to help them experience what it feels like to be in the other person's position (Gu et al., 2022). Visualize abstract concepts, such as what the world would be like if we could see it through the eyes of others (Bertrand et al., 2014). Express their comprehension of phenomena by creating or manipulating the virtual environments by the possibility of immersion not in another environment but in another person's body (Oliveira et al., 2016).

Through VR, immersive and interactive experiences can be designed and developed, allowing users to explore the nuances of consent in a low-stakes environment. This environment can provide a safe space for people to explore consent in various situations, such as asking for a hug in uncomfortable situations. It also gives an experience of

embodiment as it enhances the sense of presence and immersion in the virtual environment, therefore offering the user the essence of being present in the conditions.

1.1 Motivation

During my educational journey at OCAD University as a Digital Futures student, I was exposed to the world of developing experiences using immersive technology. During an opportunity I received during the Summer 2022 term, I was part of a team building an immersive game for an escape room company, which made me realize the potential of immersion. That is when I started to explore VR to use it more effectively. The first idea that came to me was using VR as a learning tool, as it allowed me to immerse in an environment that could create scenarios to immerse in and learn through being present virtually. It gave me the platform to build scenarios inspired by real-life scenarios and let users be a part of them briefly when they were using the VR headset. I have always loved the idea of learning and teaching; I have found learning more impactful when I have been taught through an interactive method and found VR as the tool to facilitate the learning process.

While exploring learning platforms, I was reminded of a project I had worked on in 2019 with Untaboo² - a safety and sex education company based in India. I designed and built a platform driven by gamification for youth to learn about the different aspects of sex education. It was a big breakthrough for parents in tier two and tier three cities as it

² <https://www.untaboo.in/>

helped them understand that sex education was just not about sex. It had several aspects to it. Looking at the impact it helped create, this project has always been close to my heart.

I started researching the existing tools and techniques used to teach and train individuals about body safety, puberty, sex, sexuality and relationships in a positive manner.

'Consent' was one of the most related topics, as it plays a significant role in our daily interaction with others. This led me to think more extensively about what it would be like if my parents had taught me about consent early in life. Would it have made it easier for me to say 'No' to people? Would I have had the courage to say 'No' to things I did not want to do? Would it have prepared me better to say 'No' to a stranger when they offered me a coffee? I would wonder if there was a way I could turn the tables and let the stranger be in my position and see through my perspective.

That is when I decided to align my current learnings with a cause that has always been close to my heart. I started researching the existing learning tools that use VR to learn and train. This led to interesting findings, and a few of them that piqued my interest were VR as a tool for roleplaying to find the effects of bullying at school (Gu et al., 2022); Offenders became the victim in virtual reality (Gonzalez-Liencrez et al., 2020), using a virtual character in a dialogue systems training application (Hubal & Day, 2006), the colourblind role in promoting helpful behaviours for people with colour blindness (Ahn et al., 2013). This research inspired me to think, research and design scenarios based on existing VR and consent frameworks to train individuals about affirmative verbal consent.

1.2 Research Summary

As I considered these issues further, I became increasingly interested in using VR as a learning tool for consent. I envisioned a conversational roleplaying nonplayer character (NPC) tool where participants would be immersed in scenarios based on day-to-day encounters, have a verbal conversation with the training agent and receive prompts to understand and learn about verbal consent. By bringing immersion, a new teaching perspective is explored, revealing the fluidity of storytelling and learning through encounters.

Problem Statement

The problem with consent is that it is not always clearly understood and communicated. Too often, individuals do not take the time to discuss their expectations, desires, and boundaries with each other, leading to confusion, misunderstanding, and potential abuse. There is a need for more comprehensive and nuanced approaches to teaching consent that address the complexities of consent and the diversity of experiences and identities. Additionally, many people need to be educated on the importance of consent. Some may need to be made aware of the laws and regulations that protect individuals from unwanted contact.

Hypothesis

Through exploring these concepts, a new objective for my thesis emerged: Can an immersive virtual environment with a conversational role-play training tool help individuals learn about verbal consent?

Research Question

This research explores ideas and concepts to answer the following questions:

- How can an immersive virtual environment with a conversational tool help users practice and learn the nuances of consent?
- How can Virtual Reality (VR) be used as an educational tool based on existing consent frameworks?

Through this experience, I plan to explore the potential of VR as a teaching tool and use existing frameworks to build a more impactful method of teaching individuals about consent and its implications in daily life.

1.2.1 Goals and Objectives

This thesis project aims to create a safe virtual space where users can interact, experience, learn, and practice verbal consent. The first objective is constructing a conversation tree based on existing consent frameworks and drawing inspiration from sex education games focusing on verbal consent. The second goal is to design an environment that leverages virtual reality (VR) to create an immersive experience with scenes relevant to real-life scenarios. Additionally, this project will investigate the development of an experience that will help users apply their learnings to real-life incidents, act appropriately and help evoke empathy.

1.2.2 Outcomes

The research contributes to the education tools currently used to teach consent, supported by prototypes developed using the game engine Unity and its SDKs. The thesis outcome will include the following:

1. A learning tool designed for VR, a proof-of-concept prototype to demonstrate the learning journey of users
2. Exploring different tools and methods to develop and design the experience; assessing the impact through user testing.

Participants' understanding of consent and attitudes toward it are anticipated to benefit from VR-based education. It is anticipated that the immersive and interactive nature of virtual reality will boost the efficiency of education, resulting in a deeper comprehension of the concept and its significance for fostering healthy relationships. In addition, the quantitative data will reveal VR's potential as an educational tool in this field.

1.3 Terminologies

This section presents important keyword for this research.

Immersion

Immersion is the user's engagement with a VR (virtual reality) system that results in being in a flow state. Immersion to VR systems mainly depends on sensory immersion, defined as 'the degree to which the virtual simulation engages the range of sensory channels' (Kim & Biocca, 2018).

Virtual Environment

Virtual Environments (VE) refer to computer-generated settings where virtual objects, which are not physically present, are presented on a device, allowing users to interact with them through a technological interface in real time (Figure 1)). Virtual Worlds (VW), such as Second Life, are a type of VE that provide uninterrupted virtual environments accessible 24/7 (Flavián et al., 2019). Virtual Reality (VR) is a computer-generated environment where the user can navigate and interact, triggering real-time simulation of his or her senses and providing an immersive sensory experience (Guttentag, 2010).

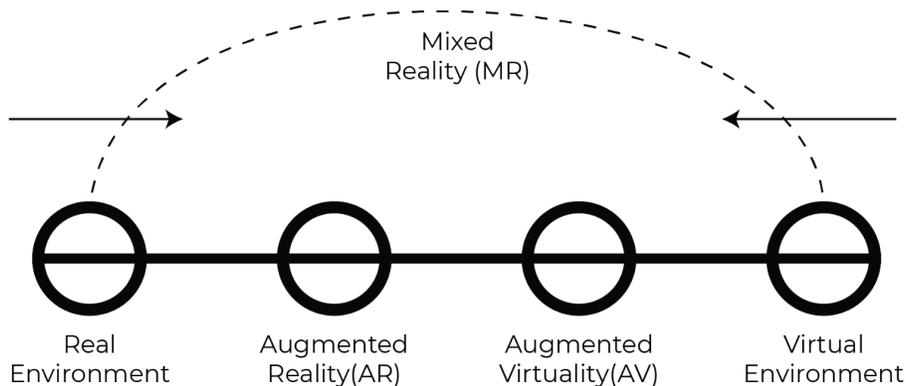


Figure 1: Adapted from Milgram and Kishino's reality-virtuality continuum (Milgram et al., 1994)

Presence

The concept of 'presence' within virtual reality is the feeling of existing within the virtual world. Although it is a perceptual illusion, it is not a cognitive one. It means that while the perceptual system detects events and objects in the environment, the brain-body system automatically responds to these changes. However, the cognitive system takes time to process these experiences and determine that they are illusions (Berkman & Akan, 2019).

Consent

As per Canada's Department of Justice, 'consent' has been defined as the voluntary agreement of the complainant to engage in an activity (sexual) in question as per Subsection 273.1(1) (Government of Canada, 1999). For greater certainty, subsection 273.1(2) sets out specific situations where if there is no consent in law, then no one obtains consent.

Where the complainant expresses, by words or conduct, a lack of agreement to engage in the activity or where the complainant, having consented to engage in sexual activity, expresses, by words or conduct, a lack of agreement to continue to engage in the activity

Affirmative Consent

It is the idea that someone must ask for—and earn—enthusiastic approval before interacting with another person (J. Val et al., 2008). Affirmative consent, sometimes abbreviated as "yes means yes," is a step before interpersonal contact that aims to assure agency and successful outcomes.

Non-Player Character(NPC)

A character that contributes to human-player interactions in a game by communicating with them through text or audio, providing clues, deceptions, information, items, or other activities that allow the player to complete a game (Scott et al., 2011).

Embodiment

It is an effect where the body, sensorimotor state, morphology, or mental representation play an instrumental role in information processing (Körner et al., 2015). In the virtual reality application context, ensemble sensations arise with being inside, having, and controlling a body (Kilteni et al., 2012).

Agency

The spatial and temporal relationships between an action and its effect determine the extent to which our actions cause effects (Farrer et al., 2013). The concept of agency in VR is the ability to actively engage in a virtual environment and control one's actions relates to the concept of agency (Piccione et al., 2019).

1.4 Chapter Overview

Following my exploration of the thesis's origin, this document continues with **Chapter 2**, a reflection on literature. **In Chapter 3**, I explore the existing frameworks in VR, the factors contributing to building an immersive experience, and methods to assess those factors. **Chapter 4**, I explore and unwrap the existing consent frameworks that reflect on the meaning of consent and different types of consent, what it means to give consent and the various ways an individual can provide consent. These frameworks were used to design conversation trees which were further used to build the scenarios. It also reflects upon the related works in this field and my learnings. It also covers the use of VR as a teaching tool, its use in the past, how it continues to be used as an educational tool, and the ability to roleplay in VR. **Chapter 5** covers the research methodologies used during the research process. the participatory methodology, and quantitative data analysis of the pre-and

post-survey data. **Chapter 6** overviews the exploration of building and designing scenarios, training the NPC model with an NLP system, and using existing Oculus SDKs to build the prototype. **Chapter 7** provides an overview of the research, the process with individuals, the outcomes, and my findings. In conclusion. **Chapter 8** covers my research analysis and how I was able to investigate my research questions. I recapitulate the present documents, discuss the scope and limitations of the research, and elaborate on future work and iterations.

Chapter 2: Literature Review

This chapter presents a comprehensive review of the current research and theoretical frameworks surrounding the utilization of virtual reality (VR) as a teaching tool, explicitly emphasizing the importance of immersion and its relationship to facilitating learning outcomes. In addition, the concept of immersion within VR is discussed, including the role of an autonomous agent in enhancing immersion and promoting effective learning. The chapter also explores the integration of VR technology into educational settings and its potential benefits.

2.1 Virtual Reality As A Teaching Tool

Virtual reality technology has significantly progressed in various fields, including education, training, games, entertainment, and social networking, especially psychological treatment like anxiety disorders and acrophobia. (Gu et al., 2022). VR is not necessarily a storytelling medium; it is often essentially an experiential medium (Popat, 2016). There are several educational advantages of using VR. Virtual environments can dynamically

change the stimuli variables that are difficult to control in the actual world easily, such as distractions and stimulus load, and provide a secure and stable experience (Neo et al., 2021). Different inputs in computer-controlled environments can also be modified to elicit various degrees of emotion (Rizzo et al., 2004). Virtual reality gives a platform to design, manipulate and control the perceived scenario and rehearse it repeatedly for as long as the user needs. It is complicated and sometimes impossible to achieve in physical reality. Virtual reality techniques are encouraged by their unique advantages of easily manipulating the perceived scenario but, more importantly, varying in a controlled way associated with the embodied experience that would hardly be possible in physical reality (Herrera et al., 2018). It can make learning more exciting and fun, improve motivation and attention, and decrease costs when using the objective and the real environment, no matter how expensive the simulation is. It also makes it possible for impossible situations to explore in the real world to be mimicked (Piovesan et al., 2012). For educational purposes, virtual platforms usually simulate the classroom or the laboratory. However, sometimes, they provide a safe environment to test scenarios that would be too difficult or dangerous to perform in real life (Kamińska et al., 2019).

VR learning environments, particularly the more immersive ones, allow for realistic 3D data visualization, interactive experiences, and a virtual environment that can sometimes mirror the real world. These environments enhance learning by providing unique and engaging ways, including immersive and experiential, personalized, interactive, and accessible learning experiences. It allows learners to immerse themselves in realistic simulations and environments, practice skills in a safe environment, work together in

virtual environments, and access learning experiences otherwise inaccessible to them to learn and motivate learners (Mulders et al., 2020). Acquiring knowledge is a dynamic process of building understanding. Even the most advanced, engrossing, and lifelike virtual reality environment will only lead to learning if the learners actively participate in learning activities. Thus, it is suggested to offer productive learning tasks that facilitate knowledge creation and its application to new, problem-based scenarios within or outside virtual reality (Mulders et al., 2020).

Another advantage of VR in teaching is its ability to provide a safe and engaging learning environment. It can provide realistic simulations of dangerous situations, such as operating machinery or navigating hazardous environments, without the risk of physical injury. This type of virtual training allows learners to practice and hone skills in a safe, controlled environment. It has also been used to teach safety practices in industrial manufacturing workplaces or dangerous conditions such as accidents or disasters (Meiliang & Qiaoming, 2012). A few of the applications of VR in teaching include a mobile VR serious game aimed at teaching how to don a life preserver on an aircraft. The environment reproduces a complete 3D aircraft cabin environment, in which one can see their character in a third-person view. The player's goal is to properly make the character don the life preserver. The results of the study confirmed the effectiveness of such an approach. Here, participants, who used the VR tool, could transfer the safety knowledge to the real world significantly faster and with fewer errors than participants who used traditional safety briefing cards (Chittaro et al., 2018). Additionally, it offers an authentic learning experience that other media like video cannot match, such as the ability to

manipulate elements of mechanical installations not available in the real world, making it a better opportunity to explore and learn about consent.

2.2 Immersion In Virtual Environments

In VR, a concept that is frequently mentioned is "immersion". It is usually used with the more restricted meaning of "spatial immersion". Spatial immersion into virtual reality is a perception of being physically present in a nonphysical world. The perception is created by surrounding the user of the VR system with images, sound or other stimuli that provide a very absorbing environment. Spatial immersion occurs when a player feels the simulated world is perceptually convincing; it looks "authentic" and "real", and the player feels that they are "there" (Laura & Michela, 2015).

Immersion is the user's engagement with a VR system that results in a flow state. It is the objective level of sensory fidelity a VR system provides (Bowman & McMahan, 2007).

Immersion in VR systems mainly depends on sensory immersion, defined as "the degree to which the range of sensory channel is engaged by the virtual simulation (Kim & Biocca, 2018).

Spatial immersion refers to the sensation of being physically present in an intangible environment in VR. A perception can be formed by surrounding the user with visuals, sounds, or other stimuli that create a highly immersive experience. Users can experience spatial immersion when they see the virtual environment as captivating, seeming "genuine" and "real," and experiencing a sense of presence (Bowman & McMahan, 2007). Considerable work has demonstrated VR's ability to elicit behavioural responses to

virtual environments, even when the participant is aware that the environment is not "real", as in demonstrations of the classic "pit demo" (Meehan et al., 2003). Past research suggests that VR is a useful research tool for simulating real-life environmental features. It allows researchers to immerse participants in theoretical contexts and study their responses to controlled environmental manipulations otherwise difficult to examine in real-life environments (Neo et al., 2021).

2.3 Role Of Autonomous Agent In VR

An agent is autonomous if it is "situated within and a part of an environment that senses that environment and acts on it, over time, in pursuit of its agenda and to effect what it senses in the future" (Sun & Botev, 2021). The interaction with intelligent autonomous agents (IAA) is mainly mediated via standard two-dimensional displays, for instance, desktops and smartphones. They can be used to interact with user input devices such as a mouse, keyboard, or touch-sensitive screens, and they are frequently developed by the WIMP paradigm (windows, icons, menus, and pointers). Virtual reality (VR) and other immersive technologies alter these patterns by combining many parts and sensory systems to enable more organic engagement, such as motion and gestures. It enables users to communicate with IAA in a way comparable to how they communicate with people in the real world (Sun & Botev, 2021).

Virtual Reality (VR) is another area where IAA are important, but its sensory and immersive nature especially encourages novel forms of communication (Tulshan & Dhage, 2019). VR devices can provide a high level of immersion that standard two-dimensional

displays can hardly convey (Sun & Botev, 2021). It has added benefits when used in VR by being more natural, intuitive, and content in a game environment facilitating users' information processing while utilizing virtual maps (Dong et al., 2020). With the recent developments in artificial intelligence research and the exponential expansion of computing power, intelligent autonomous agents (IAA) are multiplying and changing quickly. IAA is interwoven into many facets of daily life, from chatbots to personal virtual assistants and medical decision-aiding systems to self-driving or self-piloting systems, whether or not the users know it.

Using an autonomous would be instrumental for individuals to practice and learn consent without the fear of being judged, and they can repeatedly practice without inhibitions. As a researcher, it allows me to design the environment in a controlled manner by reducing or increasing complexities depending on the situation.

Summary

The literature review provides a foundation for research into utilizing virtual reality (VR) as a teaching tool. By exploring the current research and theoretical frameworks surrounding the use of VR in education, this literature review provides an understanding of the potential benefits and limitations of using VR in educational settings. It highlights the importance of immersion, the role of an autonomous agent in VR, its relationship to facilitating learning outcomes, and the potential advantages of using VR for providing a safe and engaging learning environment.

Chapter 3: Design Framework

To investigate the various factors influencing the virtual reality (VR) experience, I researched existing mixed reality frameworks. This exploration allowed me to understand better the factors that required attention when exploring, designing and evaluating my prototype. Using the framework, I developed the initial design for my prototype and created a user questionnaire to measure its impact and relevance. Framework proved valuable throughout the development process, enabling me to create a more effective and impactful VR experience.

3.1 Zeltzer's Mixed Reality Framework

David Zeltzer's "Autonomy, Interaction, and Presence" (AIP) Cube is a theoretical model used to describe the different dimensions of user experience in virtual environments (Zeltzer, 1992). Zeltzer proposed the AIP Cube to categorise and understand the key elements that contribute to the feeling of presence in virtual environments (Figure 2).

The three dimensions of the AIP Cube are

Autonomy: This refers to the degree of control and agency the user has over their virtual experience. This can include aspects such as the ability to manipulate objects, interact with the environment, and control the flow of the experience.

The autonomy axis represents the user's degree of control and agency over the virtual experience. The autonomy axis ranges from low to high, with low autonomy indicating that the user has limited control over their virtual experience and high autonomy indicating that the user has a great deal of control. Factors that contribute to autonomy in

virtual environments include the ability to manipulate objects, interact with the environment, and control the flow of the experience.

Interaction: This dimension refers to how users can engage with the virtual environment and other users. This can include aspects such as social presence, communication, and collaboration.

The interaction axis represents how users interact with the virtual environment and other users. The interaction axis ranges from passive to active, with passive interaction indicating that the user is primarily a spectator and active interaction indicating that the user is actively engaging with the environment and other users. Factors contributing to virtual environment interaction include a social presence, communication, and collaboration.

Presence: This dimension refers to the sense of being "there" in the virtual environment. It encompasses both cognitive and emotional aspects of the experience, such as the feeling of immersion and the degree to which the virtual environment feels real.

The presence axis represents the sense of being "there" in the virtual environment. The presence axis ranges from low to high, with low presence indicating that the virtual environment feels detached and artificial and high presence indicating that the virtual environment feels natural and immersive. Factors that contribute to the presence in virtual environments include immersion, sensory feedback, and the degree to which the virtual environment feels believable.

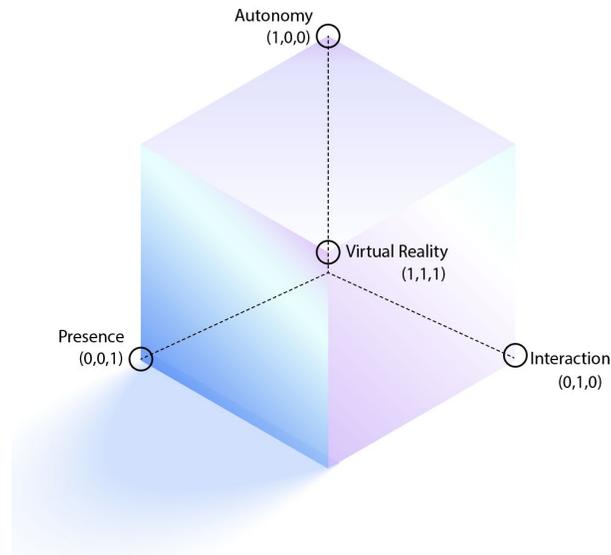


Figure 2: Adaptation of Zeltzer API cube, 1992

The origin (0,0,0) symbolised a time in the 1960s when there was no sense of autonomy, interaction, or presence. On the other hand, the corner of (1,1,1) signifies the ideal, with "fully autonomous agents and objects that act and react based on the current state of the simulations, and respond to the actions of the human participant(s)." At this point, the sensory stimulation should be indistinguishable from reality.

Based on the axis and the components, the questionnaire was designed to gather quantitative data and analyse factors such as level of immersion and interaction when the user entered the VR scenario. The user empathy questions included the level of immersion that participants found in the prototype, their rating on the conversational interaction with the NPC and overall the use of VR as a tool for education.

3.2 Immersive Virtual Environments (FIVE)

The degree of immersion can be assessed as the characteristics of technology, and has dimensions such as the extent to which a display system can deliver an inclusive, extensive, surrounding and vivid illusion of a virtual environment to a participant (Slater & Wilbur, 1997).

The "inclusiveness" (I) of the experience refers to how completely virtual reality blocks out the physical world. The "extent" (E) of sensory involvement refers to the different senses engaged in the experience. The "surrounding" (S) aspect refers to the breadth of the virtual environment, whether it encompasses a wide area or is limited to a small field of view. "Vividness" (V) pertains to the level of detail, accuracy, and variety of the simulated experience within a particular sense, such as vision or hearing. It includes factors such as the clarity and richness of the display and the amount of information it conveys.

Presence- Presence refers to a person's perception and experience of being in a particular environment, both subjectively and objectively. The subjective aspect of presence is the individual's assessment of how real and immersive the environment feels, including their ability to accept the virtual environment as a believable "place." The objective aspect of presence is demonstrated through behaviour, such as acting within the virtual environment like how they would act in a similar situation in real life. The subjective aspects of presence may be tied to higher levels of immersion, while the objective aspect may be linked to more fundamental immersion components.

Drawing from the FIVE frameworks, I used inclusiveness, vividness and extent as the features of the design and execution of the scenarios in VR.

3.3 iVR-Framework

“iVR has the potential to be effective for learning and simultaneously makes learning more enjoyable than traditional media like slide show presentation” (Mulders et al., 2020).

Learning is more than just consuming information; constructive learning activities must be integrated, inside or outside the virtually designed world, if meaningful learning with iVR should happen. The framework considers the critical features of VR, i.e. immersion, interaction and imagination. It is based on the existing cognitive theory of multimedia learning processes. It considers the user's prior knowledge and incorporates it to facilitate efficient knowledge building in virtual reality (iVR) learning (Figure 3).

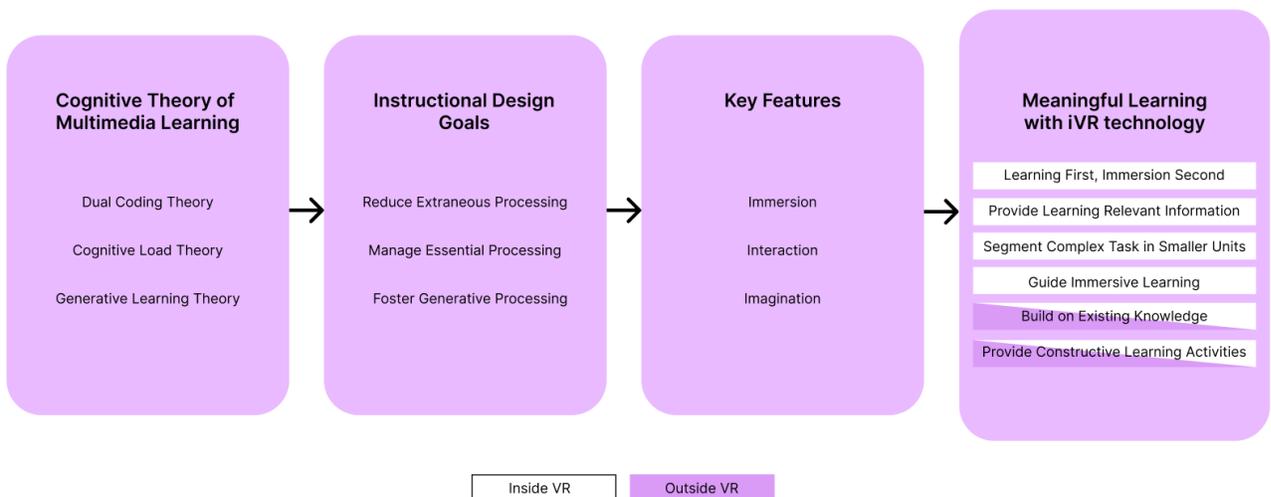


Figure 3: Adapted iVR learning (M-iVR-L) framework (Mulders et al., 2020)

This study's VR research methodology was developed using the iVR learning (M-iVR-L) framework outlined by Mulders et al. (2020). The iVR framework was employed during

the prototype phase to address various scenario-related factors. Specifically, it enabled an assessment of the scenarios' prioritization of learning over immersion and providing relevant information within the VR environment. Lastly, the framework was used to build upon existing knowledge and considerations related to obtaining consent from research participants.

Chapter 4: Consent Frameworks and Related Works

This chapter provides an overview of existing frameworks utilized in various contexts, including the legal and healthcare sectors, as well as educational institutions, to facilitate the learning and implementation of verbal consent. Drawing from these frameworks, conversational dialogue trees were developed and subsequently integrated with controlled scenarios within the virtual reality (VR) environment. These efforts aimed to enhance participants' understanding of and ability to communicate consent effectively in various settings.

4.1 Affirmative Consent Framework

There are different definitions of consent, including intellectual, popular, and legal meanings. There are four types of consent: implied, affirmative, informed, and unanimous. As per the Information and Privacy Commission of Ontario³, implied consent is not given explicitly but can be inferred based on the individual's actions and the facts of a particular situation. One may imply consent for using personal information if you collected it directly

³ <https://www.ipc.on.ca/>

and to provide a service. For example, if a parent gives their personal information directly so they can provide a service, this may imply their consent to use it for this purpose.

Affirmative consent is the idea that someone must ask for—and earn—enthusiastic approval before interacting with another person (J. Val et al., 2008). It is the idea that someone must ask for—and earn—enthusiastic approval before interacting with another person (Im et al., 2021). The consensus between scholarly, popular and legal understandings of consent is that consent is some form of agreement to participate in sexual activity (Beres, 2014). These definitions vary based on the nature of the agreement and who can enter into such an agreement (Beres, 2014). It is also defined as ‘free verbal or nonverbal communication of a feeling of willingness’ (Hickman & Muehlenhard, 1999).

- Consent is a process between two people
- Consent is specific to each activity
- Consent can be given or retracted at any time
- Consent can only be given with a clear mindset
- Consent is ongoing
- Both partners need to feel safe and comfortable
- Consent does not exist if pressure or coercion is used to gain it

4.1.1 Consent Frameworks In Educational Institutions

As per the Sexuality Education Resource Centre (SERC)⁴ consent is about asking, listening, and respecting. When someone gives consent, they say YES to the activities freely and

⁴ <https://serc.mb.ca/>

enthusiastically, and with a clear and sober mind (meaning without using drugs or alcohol). For example, they might say: Yes! OK! Absolutely! Yes, please! Sure! This does not mean yes if a person says any of the above with uncertainty or looks uncomfortable or unsure. Consent is about much more than words. It is best to ask for clarification (Age-of-Consent, 2023).

The law requires colleges and universities to provide comprehensive education and training on sexual violence prevention and response (*Campus Sexual Violence Elimination Act (Campus SaVE)*, n.d.). It also requires colleges and universities to have policies and procedures to prevent and respond to sexual violence. Following the guidelines, Toronto Metropolitan University (TMU)'s has a consent framework for students, teachers and staff members:

- Consent is active and continuous, not passive or silent.
- It is the responsibility of the person who wants to engage in physical contact or sexual activity to ensure that they have consent from the other person(s) involved.
- Consent is not the absence of “no” or silence.
- Consent to one sexual act does not constitute or imply consent to a different sexual act.
- Consent is required regardless of the parties' relationship status or sexual history.
- Consent cannot be given by someone incapacitated by alcohol or drugs, who is unconscious (including being asleep), or who cannot otherwise give consent.
- Consent is impossible if an individual uses power or authority to manipulate someone into saying “yes.”

- If a survivor's judgement is impaired, consent is not valid.

4.1.2 Consent Framework In Law And Healthcare

Informed consent in healthcare refers to legal rules that prescribe behaviours for physicians and other healthcare professionals in their interactions with patients and provide for penalties, under the circumstances, if physicians deviate from those expectations. To an ethical doctrine, rooted in our society's cherished value of autonomy, that promotes patients' right to self-determination regarding medical treatment; and to an interpersonal process whereby these parties interact to select an appropriate course of medical care (Berg et al., 2001).

Consent in law has two crucial components in law. The first law establishes who can provide consent, which depends on age, mental capacity, physical ability, etc. The second law concerns how consent is communicated or "what counts as consent" (Beres, 2014).

According to studies looking into the concept, consent can be conveyed in various ways.

Based on the affirmative consent framework, this research focuses on building dialogue trees that can be integrated into verbal consent scenarios. These scenarios are designed in VR environments to bring immersion and help users train and practice consent.

As per the Health Care Consent Act⁵, Ontario

- The consent must be informed.
- Consent must be given voluntarily.

⁵ <https://www.ontario.ca/laws/statute/96h02/v30>

- The consent must not be obtained through misrepresentation or fraud
- If the person knows of a wish applicable to the circumstances that the incapable person expressed while capable and after attaining 16 years of age, the person shall give or refuse consent by the wish

Summary

Consent frameworks were instrumental in designing the tool in VR as they provided guidelines and principles that prioritize user safety, clear communication, empowerment, respect for boundaries, and continuous improvement. These frameworks emphasize the importance of clear communication, empowering users, and respecting user boundaries. Based on these variables, the tool ideation process of the tool came into the picture, followed by incorporating these factors to build a tool that could ensure users have control over their experiences and feel safe while using the tool as well as mimics a real-life scenario which is similar to a one that they could encounter.

4.2 Related Works

This chapter reflects upon the key takeaways from the current methods and techniques employed to educate people about sex education, as well as various methods of designing games, videos, and platforms that concentrate on keeping players engaged while also ensuring they have a complete understanding of the concept of consent.

Touch Talk: The consent game

It is an educational tool designed to facilitate discussions and educate individuals about consent in a fun and interactive way. Created by the Sexual Assault and Relationship

Violence Program (SARV) at Seattle Education and Resource Center (SERC) (Co-Charis et al., n.d.). The game is meant to help individuals understand consent, how to ask for it, and how to respect other people's boundaries. The questions and scenarios cover a range of topics related to consent, such as how to ask for consent, how to give consent, and how to recognize when someone is not giving or respecting your boundaries. It helps individuals understand consent and how to practice it daily (Figure 4). It aims to facilitate conversations about consent in a fun and interactive way, promoting a clear understanding of what it means to ask for and give consent. By playing the game, individuals can learn the importance of communication, boundaries, and respect in all relationships. The game is designed to be an educational resource for individuals of all ages, in a variety of settings, including schools, universities, and community organizations, helping to raise awareness and promote healthy communication skills.

Touch Talk: The Consent Game

ACTIVITY:

1. Introduce the concept of consent – consent is an active agreement involving two or more people. In terms of sexual touching, all persons involved must fully and actively agree to the sexual touching before it happens, and continually agree while it is happening.
2. Pass out phrase cards to participants, or go through them as a large group.
3. For each phrase, have the participants declare whether the phrase may communicate sexual consent.
4. Debrief the activity and discuss any questions. Be sure to stress that there is no middle ground or "maybe" sign. Consent requires a clear and active agreement in order for sexual touching to occur.

KEY MESSAGE:

Consent sounds like a clear, affirmative phrase.

FACILITATOR'S NOTES:

The purpose of this activity is to open discussion on consent and what a clear phrase of consent sounds like.

Phrases which may indicate consent are: **1) Sure! 2) Yes please**

Be careful to discuss context and tone, which are essential in communication. If the person is under threat or influence of drugs or alcohol, they cannot consent to sexual touching no matter how positive their phrase sounds. Additionally, if the tone of saying "sure!" is sarcastic or unsure, consent is not given.

None of the other phrases provide clear consent.

Some of the phrases are unclear – namely the "laughing," "ummm," and "I guess so." You can use this opportunity to discuss how complete clarity is necessary for consent to be present. More information needs to be received before knowing it is a clear yes. And since it is not a clear yes, then there is no consent.

When opportunity arises, be sure to talk about how consent can never be given when there are coercion or threats involved, or if any person is under the influence of drugs or alcohol. If applicable, discuss how culture impacts phrases and verbal communication of consent.



Figure 4: Touch-Talk, a consent game by the government of Manitoba

My learnings from the game were that consent is a continuous process. Touch Talk emphasizes the importance of ongoing communication and consent, even within an established relationship. Respect for boundaries, the game teaches players to respect each other's boundaries and to communicate their boundaries to others. Players can create a safe and respectful environment for everyone involved by understanding and respecting each other's boundaries. Importance of enthusiastic and clear communication: The game emphasizes the importance of enthusiastic and clear communication when it comes to consent.

AMAZE.org

AMAZE.org⁶ is an award-winning, free online platform that educates teens and young adults about sex and relationships. It offers videos, quizzes, articles, and other educational resources that cover topics like body image, gender identity, puberty, contraception, and relationships. The content is medically accurate, age-appropriate, and designed to help young people make healthy decisions and build strong relationships. The platform was created with experienced sexual education instructors, animation professionals, and young people. It combines the knowledge of experts with the artistry of animations and the connectivity of the internet. In addition to the educational videos (Figure 5), AMAZE provides resources for parents and guardians to help them communicate better with their children about sex and sexuality. It also has toolkits, lesson plans, promotional materials,

⁶ <https://amaze.org/>

and other resources so educators and healthcare providers can refer students and young people to access the material freely.

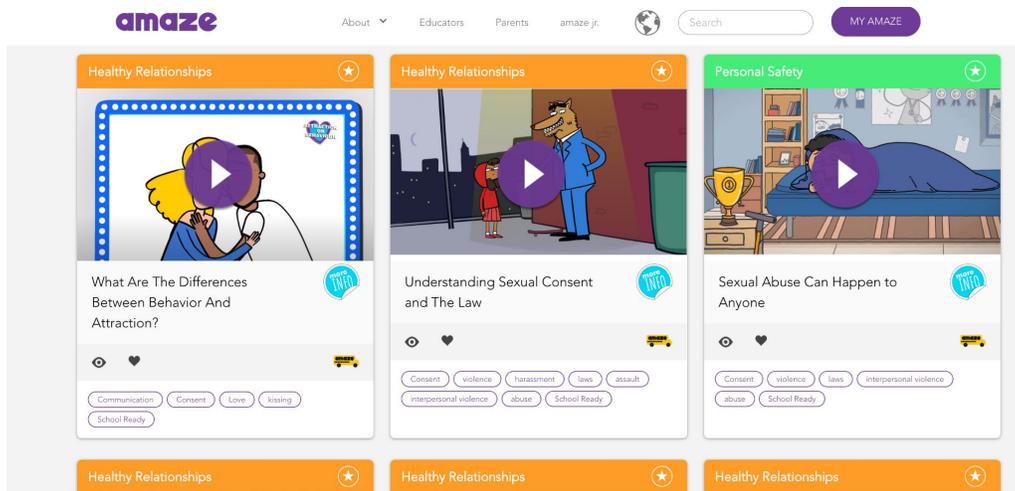


Figure 5: Amaze video repository to learn about consent. (<https://amaze.org/?topic=featured>)

The platform was the stepping stone of my research. The videos taught me how different aspects of sex education are addressed. The scripts of the videos inspired me to design my prototypes in a conversational format instead of just a one-sided interaction.

Consentacle

A cooperative card game for two players in space. It focuses on building different aspects of gaining and learning consent, such as verbal and non-verbal communication. The objective is for players to communicate effectively despite a language barrier. One player plays as a blue-haired human astronaut and the other as a tentacle-covered feminine alien (Figure 6). The two species do not have common languages, so players must communicate without using words during the game. The players and characters must establish mutual agreement and navigate a space encounter without speaking.



Figure 6: The board game with the cards

<https://boardgamegeek.com/boardgame/166976/consentacle>

The game helped me formulate the areas I should focus on for my VR scenario. It taught me that 'communication' is also an important factor of consent and how a player can communicate.

Untaboo

Untaboo⁷ is a sex education company led by industry experts. They work closely with young adults and adults aged 18-80 years. They conduct unblocking workshops to educate and clear the air around sex education; they have a gamified platform for people to use and educate themselves, as well as conduct workshops with schools, colleges and

⁷ <https://www.untaboo.in/>

corporates to make people aware of the topic. They focus on educating not only the youth and young adults but also parents on how to educate their children (Figure 7).



Figure 7: Untaboo- a sex education company (<https://www.untaboo.in/>)

Having worked with Untaboo inspired me to further research consent and current teaching methods. It gave me a perspective that sex education can be gamified and designed more interactively.

Summary

Through the related works, I gained more confidence to pursue my research topic and assess and understand how sex education is taught to adults. It allowed me to reflect upon the topics covered under sex education and how different interactive and gamified ways are currently in place to educate youth and adults about sensitive topics like consent.

Chapter 5: Research Process And Methods

Chapter 5 introduces the methodologies, conceptual frameworks used to design the study and methods involved in analysing data. It covers the methods used to gather data and assess the study through qualitative methods.

5.1 Research Methodology

Research Through Design (Rtd)

Design researchers identify opportunities for new technology or advancements that will significantly impact the world. This type of design research provides research engineers with inspiration and motivation for what they might build (Zimmerman et al., 2007).

By utilising a design-focused research approach, designers aim to create innovative combinations of HCI research to create products that bring about positive change and improve the world. This approach enables interaction designers to contribute to research areas where they excel, specifically in solving complex and loosely defined problems (Zimmerman et al., 2007). This method was used to build prototypes, enhancing and iterating (Figure 8). In research through design, design practice is brought to bear on situations chosen for their topical and theoretical potential; the resulting designs are seen as embodying designers' judgments about proper ways to address the possibilities and problems implicit in such situations and reflection on these results allow a range of topical, procedural, pragmatic and conceptual insights to be articulated (Gaver, 2012). Most of the work's output consists of artefacts and systems, sometimes with stories about how they are used in field tests. However, the result also increasingly contains various techniques,

conceptual frameworks, and ideas provided independently of practice reports. Design researchers often 'borrow' conceptual perspectives from other disciplines and discuss their applicability to design.

RTD is a valuable tool for designers as it enables them to combine different areas of expertise and collaborate with other researchers, practitioners, and stakeholders to develop solutions that address real-world problems. The resulting designs are then tested, iterated upon, and refined based on user feedback, to create effective and impactful solutions. By engaging in RTD, designers can generate new insights, techniques, and frameworks that advance the field of HCI and contribute to developing more human-centred technologies.

Based on this design methodology, the prototypes were designed. The first two prototypes focused on understanding and learning about the different approaches that could be taken to design the most impactful prototype for the research question.

Prototype 1 explored building a conversation tree based on existing consent frameworks and the possible ways to integrate it into an immersive environment. The impact of the prototype was determined with the help of the ongoing feedback from my thesis advisors and assessing the number of areas the prototype could cover in the consent framework.

The process attempted to help users experience a relevant learning tool that caters to the problem. Oculus Quest 2 was considered for this process to help users immerse in virtual scenarios and imitate real-life settings such as cafes and public transit.

Prototype 2 focused on training the AI model to have this conversation and give appropriate answers. Prototypes 3 and 4 focused on getting the conversation tree, voice SDK and scenario working together and helping users immerse and train themselves (Figure 8). Through the RTD process, I document the design and development process and log the limitations and summary upon completing the process.

This research methodology allowed me to explore and test new ideas and better understand the problem. By focusing on the user experience, I gathered insights into the prototype and the viability and effectiveness of the tool. The continuous design, testing, and iteration process enabled me to refine my ideas and develop more effective solutions.

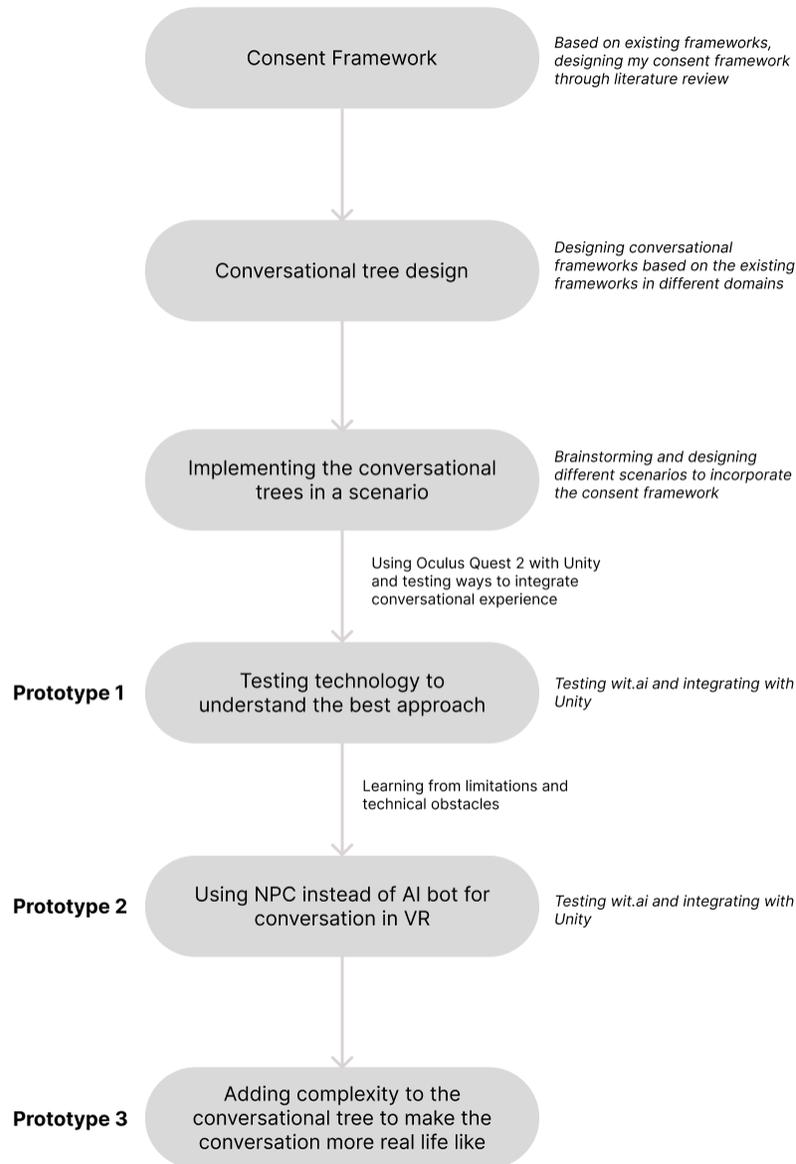


Figure 8: Research methodology followed through the thesis process

5.2 Methods

Following the RTD design methodology, I developed the prototype and made iterations per needs and methods that catered best to the study. After the second prototype, I

wanted to take the users' perspective to see the study from a different lens and make a strategic decision about the study and the way forward to make this study impactful.

5.3 User Study

The Research Ethics Board (REB), approved this study, REB #2022-91. The participants were shortlisted per the criteria and guided through the consent process and the experience (refer to appendix). The study was open to a wide range of participants 18+ years and physically available to participate. The participants who were able to visit OCAD U were shortlisted to engage in VR experience as a component of the study (to be conducted in compliance with OCADU's social distancing guidelines and equipment use restrictions during the pandemic) and to collect and access requisite VR equipment. There were no required demographics for the participants. However, participants should feel comfortable talking about consent.

Before the study, participants were informed that they could immediately withdraw from the experience if they felt uncomfortable. After the experience, participants used a laptop to anonymise all questionnaires. The participant details were retained with the rest of the research data using two-factor authentication to which only the graduate researcher (I) had access. The confidential information identifies project applicants, and the participants' contact details were destroyed at the project's end. After the data was gathered using an online form, it was analysed and synthesised using the inbuilt statistical tool of the forms. After analysing the data, I got feedback and an understanding of the relevancy and impact of the study.

5.3.1 Technology Used

The experiments utilised Oculus Quest 2, an immersive VR headset with controllers for user interaction that track the user's head and hand movements. The consent scenario was created using Unity 2021.2.16f, and the system operates on Windows 11.

5.3.2 Participants

To participate in the study, interested individuals had to be over 18 years of age and complete an Interest Screening Form (see Appendix A —Participant Screening Form). The form asked potential participants for their basic information and availability to participate in the research. The study included 10 individuals aged 24 to 29 from Toronto (mean age = 26.375 and standard deviation $SD = 1.631$). The participants were informed that they would participate in a virtual verbal consent scenario using VR technology and could withdraw at any time by not signing a written consent form or withdrawing their consent from participating during the study. The data was collected from the participants who agreed to participate and signed the consent form. A total of 10 participants qualified, and their data was used for the analysis.

5.3.3 Procedure

The following procedures were followed during the experiment: Throughout the experiment, the instructions, the context of the situation, and the interaction interface in the VR system were presented to the participants in English. The participants all acknowledged comprehending the meaning.

1. The participants were willing to participate after learning about the consent scenario.

2. After that, the participants were asked to complete the pre-survey questionnaire (see appendix).

3. After mounting the virtual reality head-mounted display (HMD), the participants were taught how to use the virtual reality system without a hitch. They were required to respond to the NPC's questions after receiving an explanation of the speech-enabled interaction.

4. Participants interacted with an NPC as the scene changed to a verbal consent scenario. They were shown visual prompts as they chose their option and learned what consent meant in that particular situation. The participant's physical movements were restricted to a small area (around a meter radius) throughout the experiment.

5. The post-survey questionnaire was given to the participants after they unmounted the virtual reality device.

5.3.4 Summary

User testing was a crucial part of this study and helped me make decisions that were not influenced by personal biases. It gave me an understanding of the missing elements and areas of improvement and helped me assess the progress made so far. Even though I could not target a larger audience, this process has given me a headstart to re-calibrate and move forward with the research even after graduating. I aim to interview individuals from diverse backgrounds, including people from different walks of life and sex educators. I would like to broaden the type of users for later testing and do user testing specific to sex educators to improve the quality of the delivery of this training tool.

From the data collected, I also understood a gap in the scope of improvements and enhancements to make the tool deliver the aim it has been built for.

Chapter 6: Consent Framework And Prototype Explorations

This chapter covers the explorations and approaches used during the thesis research process. I focused on designing prototypes, assessing them and making iterations as I utilized research through design methodology during the thesis research process.

Throughout the experimentation process, I utilized different technologies, such as software applications and existing SDKs, to assess their relevance and feasibility with the project. The research objective was to utilize Virtual Reality to help users learn about verbal consent. To achieve this, I created an immersive environment inspired by a daily routine setting. Based on existing consent frameworks, I trained a non-player character (NPC) to converse verbally with the user. Furthermore, the prompts prompt users to answer the NPC's questions with options of yes, no, or maybe. Based on the user's selection, the prompt educated the user about their answer.

6.1 Consent Framework

Based on the consent framework in Chapter 4, I further narrowed down the different aspects of the framework and focused on incorporating the following in the prototypes:

In law and healthcare	In education institutions	Affirmative Consent	Consent framework derived for this research
<ul style="list-style-type: none"> • The consent must be informed • Consent must be given voluntarily • The consent must not be obtained through misrepresentation or fraud. 1996, c. 2, Sched. A, s. 11 (1) • If the person knows of a wish applicable to the circumstances that the incapable person expressed while capable and after attaining 16 years of age, the person shall give or refuse consent by the wish 	<ul style="list-style-type: none"> • Consent is active and continuous, not passive or silent • It is the responsibility of the person who wants to engage in physical contact or sexual activity to ensure that they have consent from the other person(s) involved. • Consent is not the absence of “no” or silence. • Consent to one sexual act does not constitute or imply consent to a different sexual act. • Consent is required regardless of the parties' relationship status or sexual history. • Consent cannot be given by someone incapacitated by alcohol or drugs, who is unconscious (including being asleep), or who cannot otherwise give consent • Consent is impossible if an individual uses power or authority to manipulate someone into saying “yes” 	<ul style="list-style-type: none"> • Consent is a process between two people • Consent is specific to each activity • Consent can be given or retracted at any time • Consent can only be given with a clear mindset • Consent is ongoing • Both partners need to feel safe and comfortable • Consent does not exist if pressure or coercion is used to gain it 	<ul style="list-style-type: none"> • Consent is active and continuous, not passive or silent • Consent is a process between two people • Consent is specific to each activity • Consent can be given or retracted at any time • Consent is ongoing • Both partners need to feel safe and comfortable • Consent does not exist if pressure or coercion is used to gain it • This framework was followed through the design and prototype process

Figure 9: Consent framework derivation, further used to design the tool

Based on this consent framework, I started exploring different consent scenarios that focus on each one of these aspects and incorporating them into encounters that individuals would encounter on a day-to-day basis. I wanted to incorporate a framework as a form of a prompt or an experience through which users could understand and practice consent. Further, to develop this idea, conversation trees and scenarios were designed.

6.2 CFC Prototype

This was the first step to understanding where my research lies and the nuances around it. Upon researching related works and studying existing research in different fields, immersion was the key to the training and learning process; I started making flowcharts to understand where my research lies and the several factors I should consider to incorporate in the prototype (Figure 10a). The flowchart included the areas I wanted to explore, looking at the bigger picture, then narrowing down further to understand the factors that needed to be considered and connect with the technical aspect. These were instrumental in understanding the factors and nuances to consider in the design process (Figure 10b).

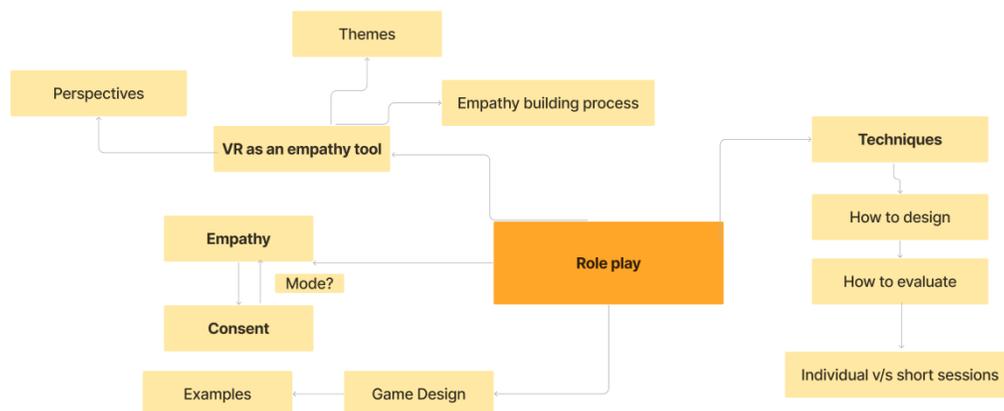


Figure 10a: Brainstorming about the concept, the different variables

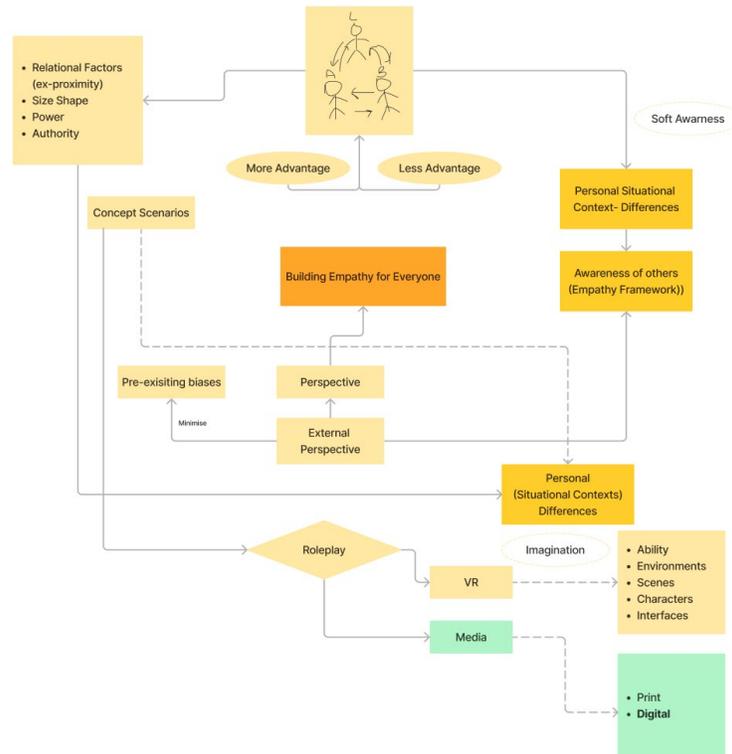


Figure 10b: Brainstorming on approaches to build an effective consent education tool

The conversation trees explored different responses to questions and scenarios related to consent. Each conversation was designed to explore the nuances of consent while allowing users to practice consent in a safe and secure virtual environment. Several scenarios were designed to address different situations, such as: -

- Being asked out for a cup of coffee by a stranger,
- Withdrawing consent,
- Agreeing to give consent without pressure,
- Dealing with pressure

These scenarios were designed to help users explore different aspects of consent and practice them in a virtual setting.

Through the CFC prototype, I brainstormed ideas and discussed these with the mentors to gather feedback and better understand and connect the missing dots. Through this process, I could identify elements that were the core of designing the prototype, followed by the variants that would help deliver the learning through different methods, keeping the end goal in mind.

The key findings that should be incorporated and tested in the following prototype:

Interaction- One of the critical aspects of the consent framework is that it is a process between two people. I had to focus on designing a prototype that could facilitate this process. I had two ideas, one was to train an AI model to help with interactions, and the second was to use an NPC for interaction with the user.

Learning cues or prompts- I wanted the users to be guided through the conversation along with prompts so that they understand if they choose to say yes, or no or what it means in a consent scenario and how they can withdraw consent once they give it.

The takeaway from this prototype was that two characters should be involved in VR and they could either talk to each other or practice consent. The factors to consider will be proximity, consent framework, and study material (Figure 11). For instance, if there are two individuals involved. They might have to be taught about consent before the study, assess how they interact in VR scenarios, and gather data to study the experiment's impact.

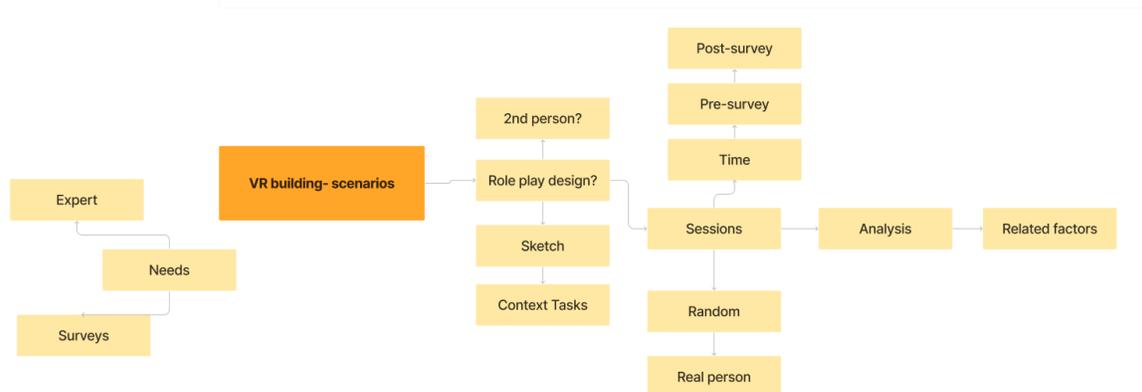


Figure 11: Journey map of the experience in VR

6.3 Exploration 2: Dialogue Tree Design

Based on the consent framework, I started designing a conversation tree. The key elements that I kept in mind were:

- Consent is a process between two people- therefore, building upon the first CFC prototype, this was an element that I ensure should be included in order to make this study impactful as well as bring it closer to a day to day scenario that one could encounter.
- Consent can be given or retracted at any time - I wanted to ensure that users understand this well and have the agency to practice this in VR. This, for me, was one of the most critical aspects of consent.
- Consent is ongoing- Building on this I visioned having a conversation where an individual can talk, give, and withdraw consent would be an apt way to proceed with this prototype.

- Consent does not exist if pressure or coercion is used to gain it- This gave me the idea that one of the characters could be a persuasive one, which will increase the level of interaction as well as build the pressure for the person experiencing this to understand, act, learn and practice if they find it challenging to say No.

Based on the consent framework, I started designing a conversation tree. (Figures 12 and 13).



Figure 12: Conversation tree first iteration

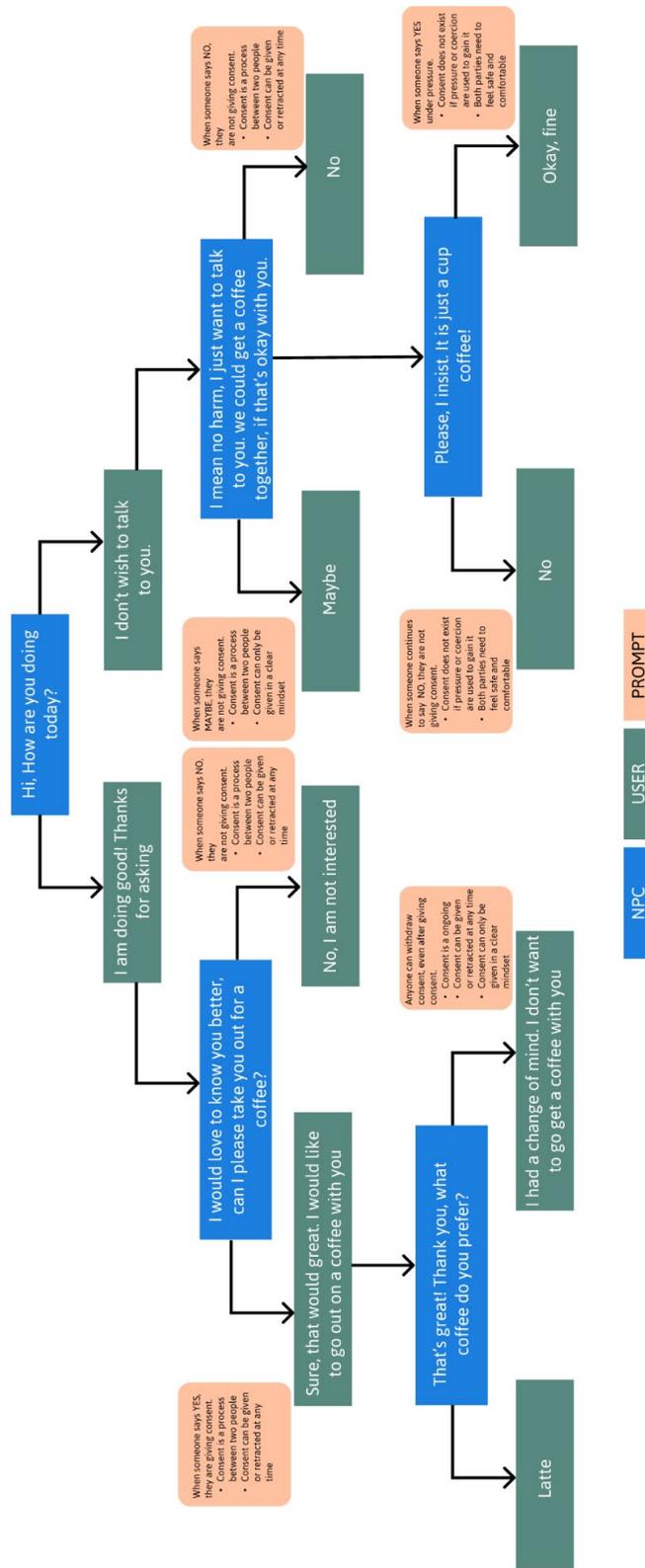


Figure 13: Conversation tree final iteration, used for prototype built in Unity

As I had limited knowledge of the technology, I explored the available SDKs and APIs to test and see the most suitable application for this study. I found Unity to serve the purpose and be easier to grasp, so I started building scenes on it and testing the available SDKs.

I used the conversation tree to train⁸ the conversational agent on wit.ai⁹ to test its integration with the game development software; Unity was the most helpful tool. With the help of Oculus voice SDK, I linked the three- unity, wit.ai and the voice SDK (Figure 14). This prototype was effective but complicated the process (Figure 15). The dialogue chart could have been achieved by using the same consent framework.

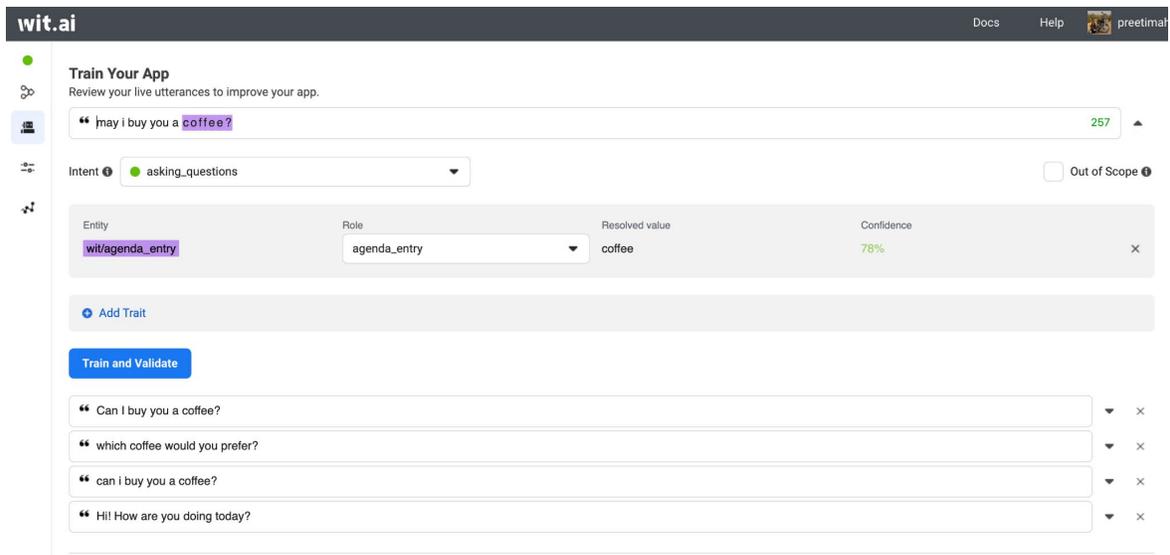


Figure 14: Training wit.ai based on the conversation tree

⁸ Learning (determining) good values for all the weights related to the input training data

⁹ <http://wit.ai/>

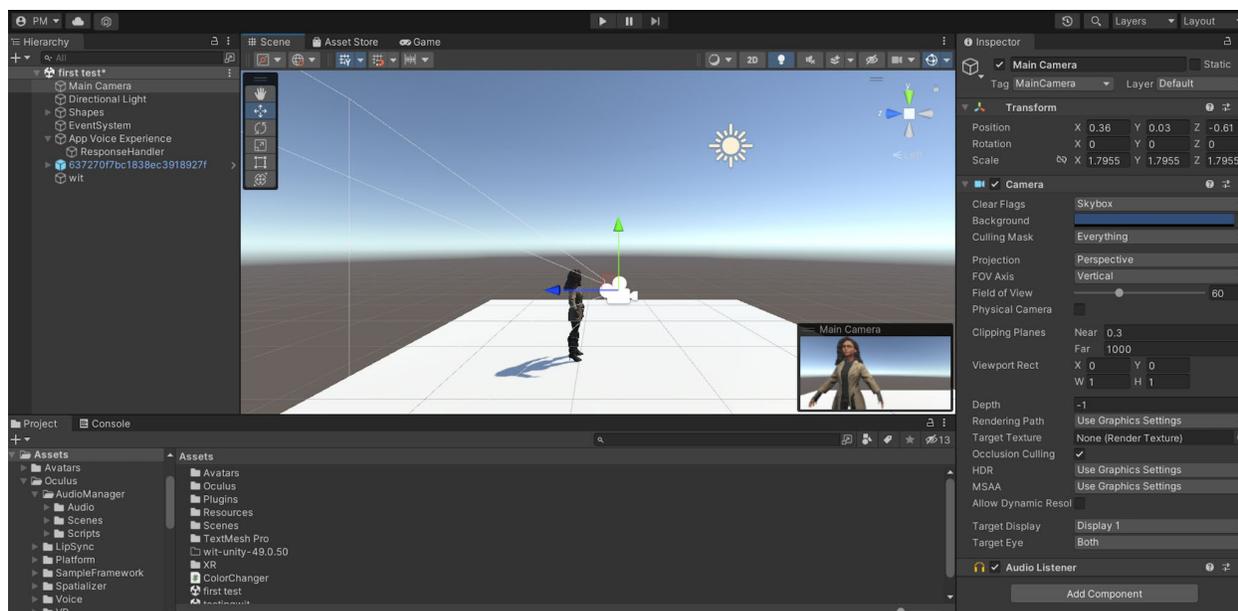


Figure 15: Testing unity for prototype

The key takeaways from this prototype were that the conversation tree was not very complex and was a good starting point as I was still testing the technology and simultaneously learning as well. Hence, a simpler conversation tree would reduce the level of complexity. This was very useful in making strategic decisions for the prototype. Keeping these limitations in mind as well as the level of complexity, helped me move forward as well as learn at the same time.

6.4 Exploration 3: VR Scenarios

I envisioned the user journey from entering the VR scenario to what they experience in the tool and how they can practice and learn consent. The steps the user would follow narrowed down to touch upon the variables and best execute the consent framework with the available technology (Figure 16).

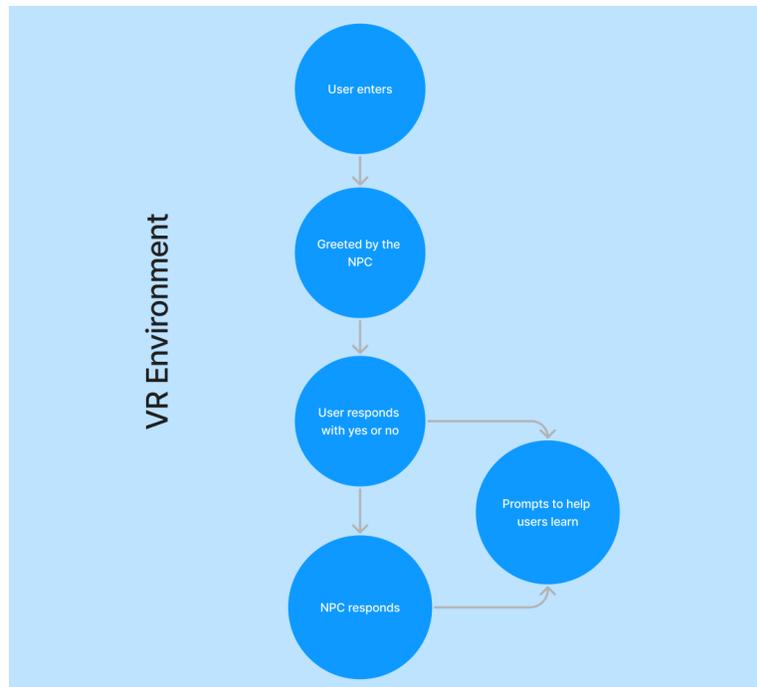


Figure 16: User journey map in the VR environment

I moved away from wit.ai as it was challenging to train the model, it was difficult to train the NLP model due to a lack of technical skills and the limited time at hand. and the conversations were complex; I was still getting to train the bot. I stopped using wit.ai and started designing the dialogue tree in Unity. This was more effective and helped me design the experiment. I started exploring the available assets in the Unity store¹⁰.

Character exploration 1:

The first character that I chose was a free unity asset and I wanted to use an intimidating-looking NPC and looking, as I thought it would help build confidence if there were in a similar situation (Figure 17). After the first install, I collected feedback from my advisors

¹⁰ https://assetstore.unity.com/?gclid=Cj0KCQjwwtWgBhDhARIsAEMcxeAKFcX8pQBelCD7f_C8bZ-kXBPTJ-mgquici24S2QGlaiCkDOvUECUaAsMYEALw_wcB&gclsrc=aw.ds

and came to a mutual resolution that it could get intimidating when someone uses the tool for the first time and the user might get scared as well. Therefore, I shifted to using a more approachable-looking NPC.

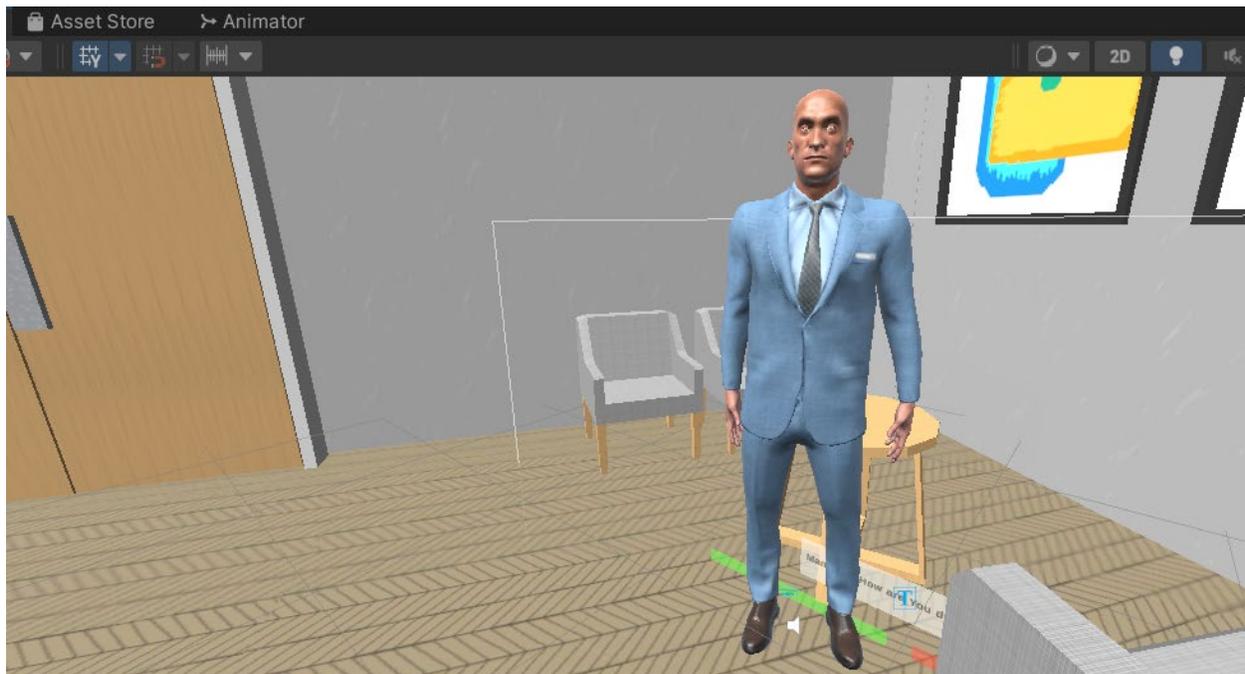


Figure 17: NPC used for the first install for Unity store

<https://assetstore.unity.com/packages/3d/characters/humanoids/humans/man-in-a-suit-51662>

Character exploration 2:

I used Ready Player Me¹¹ to design a character, which looked more approachable as well as had a generic looking appeal (Figure 18). I ran it through a few peers and well as my

¹¹ <https://readyplayer.me/>

advisors and I found it to be more approachable by them as well it was comforting for them to see this character versus the first character exploration.



Figure 18: Character created using Ready Player Me

The scenarios I had shortlisted were in context to a stranger, for instance, at a coffee shop, club, superstore, park, or public transit. Given that the target audience I had in mind was above 21 years of age, I researched where they could have these encounters and offices, colleges, and parks were a few scenarios.

I started with the overlapping scenario of a park where one could bump into a stranger and have a conversation.

Based on this, I designed the scenario and incorporated the conversation tree and the NPC. The conversation started with the NPC greeting the user and then providing the user with two options to either continue the conversation or withdraw from the conversation. The user must speak to the NPC to initiate or retreat from the conversation.

Depending on what the user selected, the NPC responds (Figure 19). The conversation was designed with a persuasive intent to educate users that consent cannot be achieved through coercion. Each prompt is followed by a UI input on the screen that educates the user about consent.

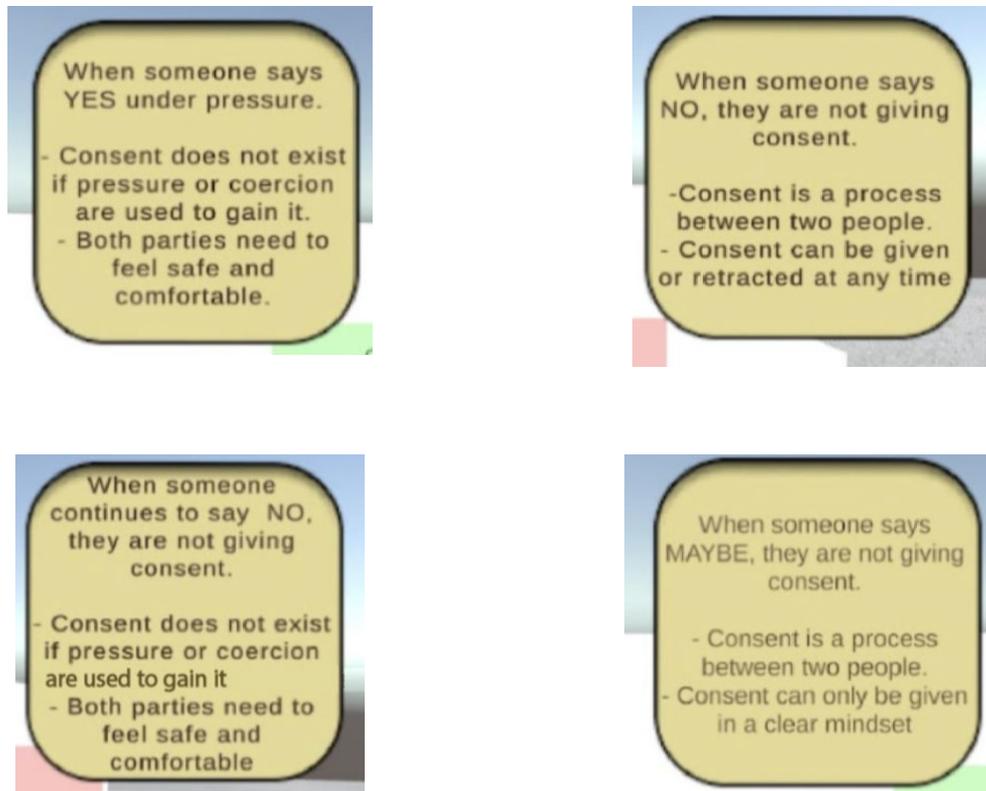


Figure 19: Consent prompt for users to learn about consent as they interact with the NPC

Through each of these prompts, the user was guided through the consent process and was allowed to rehearse, withdraw, and move forward with a conversation (Figure 20 a, 20 b, 20 c).

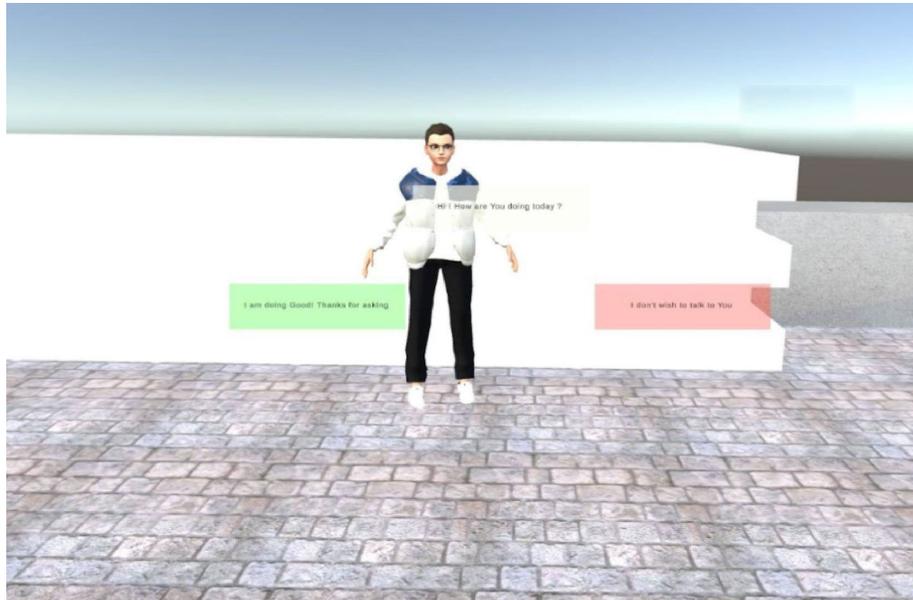


Figure 20a: The user is greeted by the NPC and provided with two options to choose from to further continue the conversation and learn as they continue talking to the NPC

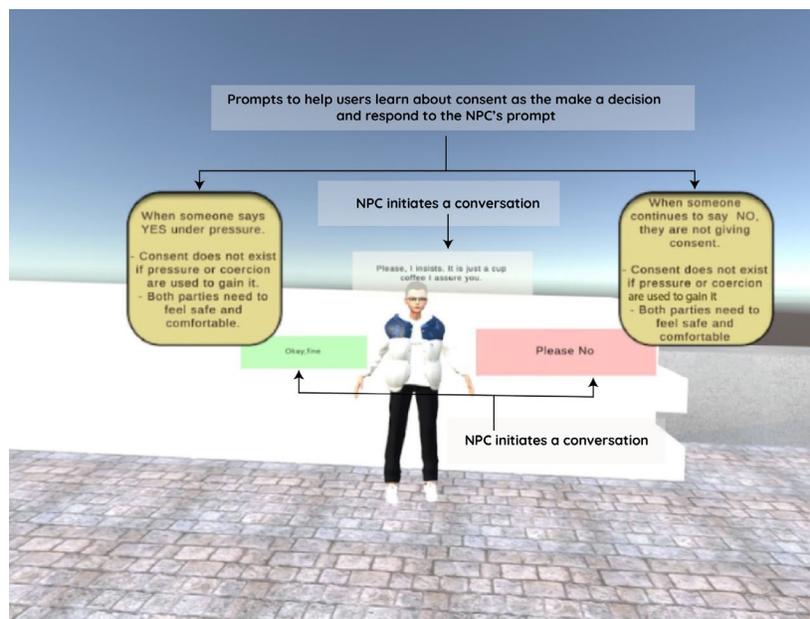


Figure 20b: A labelled screenshot from the VR experience, where the user is greeted as they enter the VR scenario followed with prompts for the user to respond from

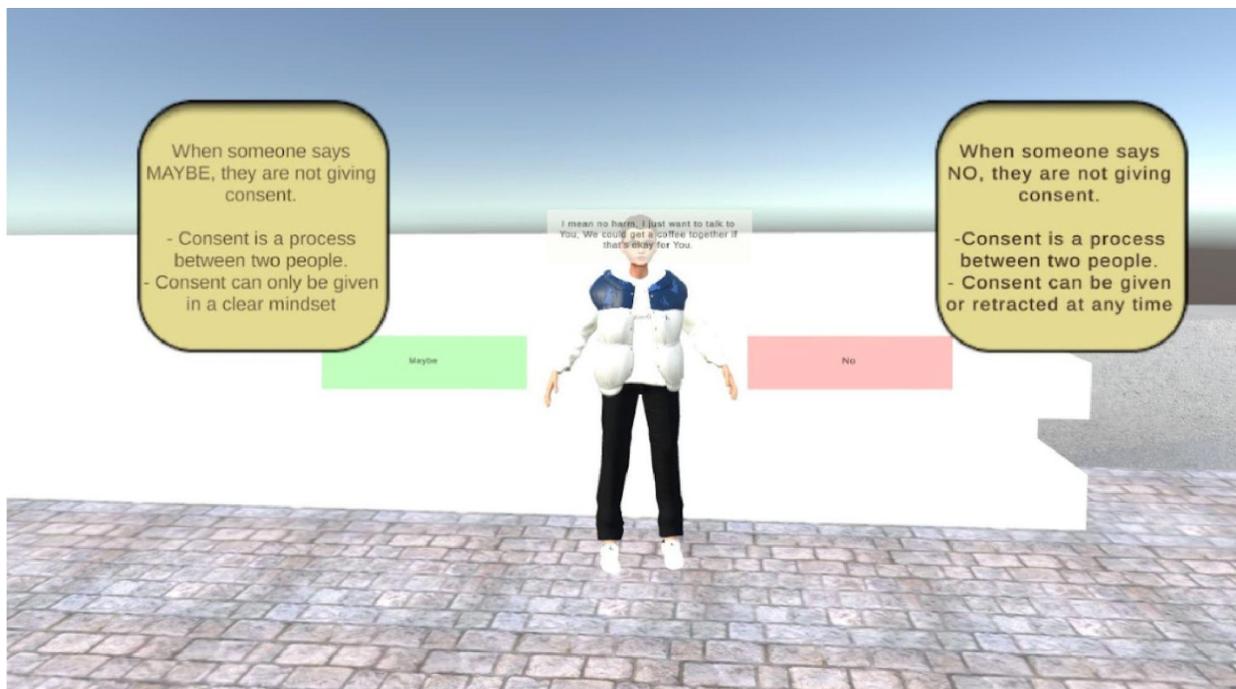


Figure 20c: Ongoing conversation with the NPC to learn to give, withdraw or not give consent

Text-to-speech was one of the ways I first approached this possible way to have this conversation. At the crux of developing this scenario, I wanted to bring it as close to a real-life scenario as possible. As my research focuses on verbal consent, it was of utmost import to add either text-to-speech (TTS) or speech-to-text (STT) as one of the functionalities of this experience (Figure 21). Which was integrated for the user and the NPC, I used pre-recorded audio to play once the user had selected their option.

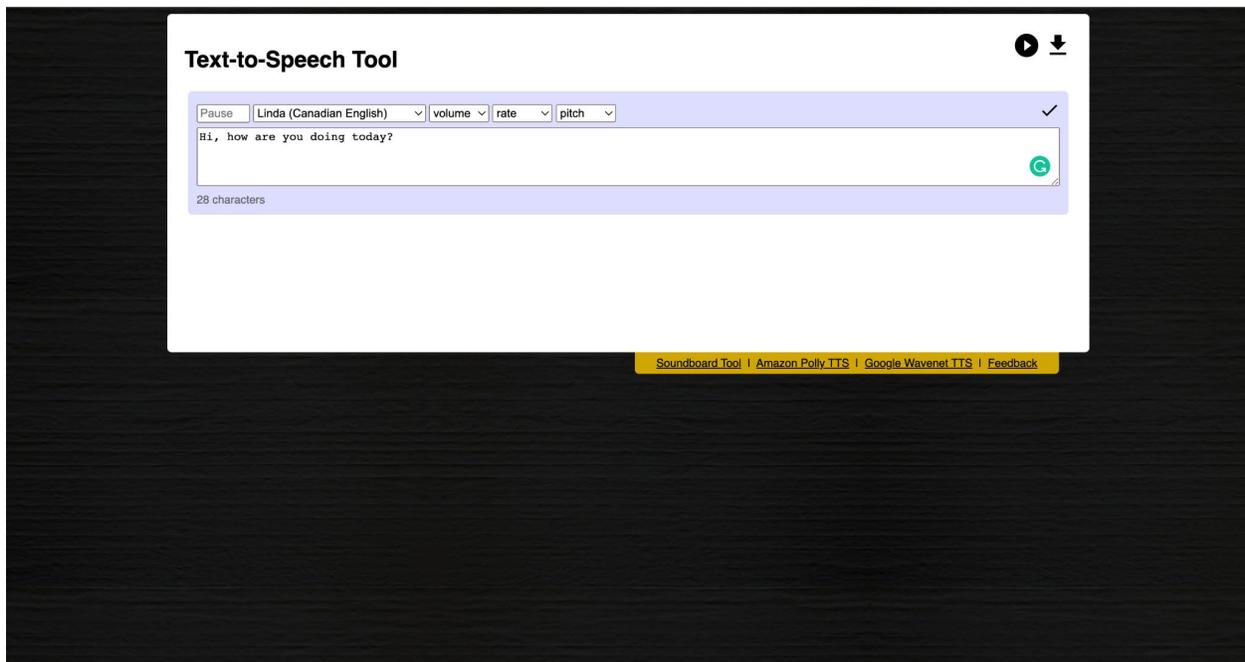


Figure 21: An online TTStool to generate audios for the NPC (<https://ttsreader.com/>)

6.5 Exploration 4: Conversation Tree Iterations

For the last exploration, I wanted to focus on the conversation tree and make it more complex to bring it a step closer to real-life scenarios. The conversations we have in a real-life scenario have different levels of complexity and different branches of the conversation. My analysis from the previous prototypes was that the conversation was linear. Now that I had cleared the technical hurdle, I wanted to take a step back and look at the prototype step by step (Figure 22).

After assessing the previous prototypes, I wanted to address the iteration that made the dialogue tree more complex. This was followed by designing a more extended conversation tree along with new variables.

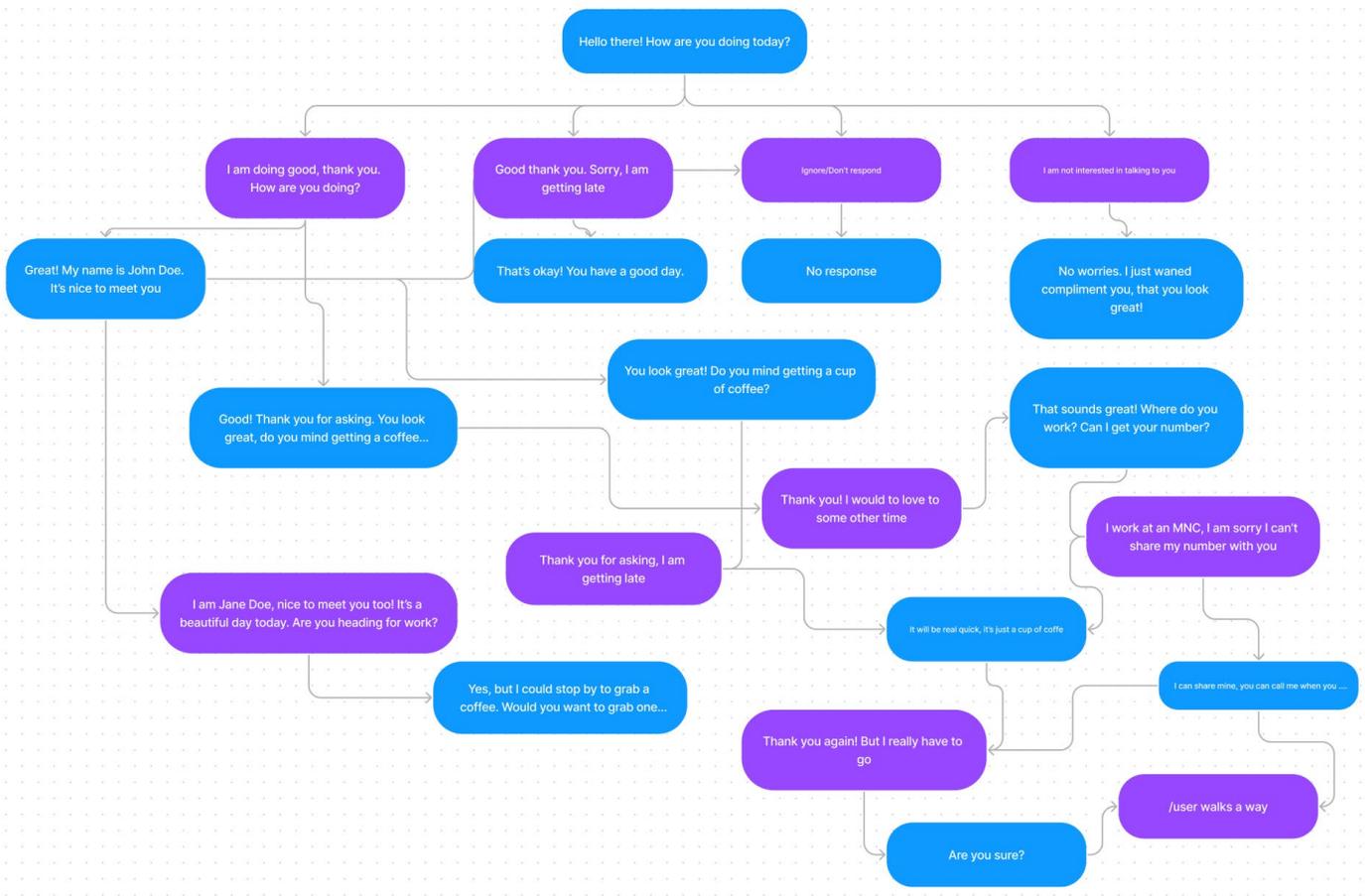


Figure 22: Iterated dialogue tree with complex conversations to mimic a more branched conversation

Summary

Through the existing consent frameworks, it was understood that consent must be informed, given voluntarily, and not obtained through misrepresentation or coercion. Additionally, they highlight that consent is a process between two people, is specific to each activity, and can be given or retracted at any time. These were used to design the consent framework, which was further used in the exploration and prototype process.

The design process was based on research and was adapted and improvised as I continued my research in the VR aspect. The learnings were incorporated into the prototype to explore the capabilities of VR and if it could be used as a teaching tool for training users in consent scenarios. Through the prototype exploration, I could also explore the different components of VR and the existing platforms to bridge the technical gap that I had.

Chapter 7: User Findings

The present chapter details the workshops conducted using the prototype's second iteration, the study's findings, scenario building and the thesis output. The technology was chosen because it best allowed me to recreate scenarios and facilitate immersion for the participants to engage and practice verbal consent scenarios or the fear of being judged. It also discusses the results achieved through gathering data pre and post-study.

Users were allowed to practice the consent framework by making choices that resulted in different outcomes. This was an important part of the experience as it allowed users to practice different consent scenarios and explore how their responses affected the outcome. The prototypes were tested with a group of participants to assess the efficacy of the experience.

7.1 The Workshops

To understand and analyse the prototype's impact and usability, I conducted two workshops on January 30th and January 31st, 2023, at OCAD University 205, Richmond Street West. After the initial recruitment period, I emailed the people who had expressed

interest and had qualified for the study (Appendix B). This was followed by signing consent forms and the study overview with instructions (Appendix C).

7.1.1 User Testing

Once a date was set, I spread the workshop across two days, January 30th-31st, 2023. I invited five participants for each workshop. The participants were physically present at the decided venue. I started by introducing myself and giving an overview of the study.

This was followed by training them on using the VR headset and informing them about its potential drawbacks or impacts. This helped the participants withdraw from the experience if unsure or uncomfortable (Appendix D).

Next, I gave them the pre-survey form to fill out on a laptop, and they were not monitored during this duration as I wanted to avoid influencing their decision or answers. Upon completing the questionnaire and the consent form, the participants used Oculus Quest 2 HMD to experience the scenarios and verbally interact and practice in the scenario (Appendix E). Once participants stepped out of the VR, they were given a post-survey questionnaire to fill out on the laptop (Appendix F).

A total of 10 participants contributed to the study and helped bring a fresh perspective. Their valuable feedback gave me ideas on how I could make this study more immersive and make enhancements. It also gave a perspective of what a user might expect when immersed in such a scenario.

7.2 Study Findings

By the end of the study 10 participants were involved in the user testing. And the entire process that was involved, from setting up the space to conducting the workshops and gathering information, took 20 hours. Around 15 participants had applied for the user testing, but only 10 could make it on the days of the user testing. The participants were based out of Toronto and could speak and read English. The participants were handed a pre-survey form to understand, in their opinion, the factors expected from a VR experience for learning and training. As well as to understand if they had any prior experiences of using VR as a learning and training tool and their overall take on the use of VR as a tool for learning. Each participant had to be briefed on how to use the headset; they were fairly new to using the device. They were informed about the VR boundary safety system and were instructed on how to stop the experience in case they felt uneasy or uncomfortable.

Watching their first reactions when they entered the virtual space for the first time was exciting and intriguing. Each participant felt different when they interacted with the NPC. The technology had difficulty registering the verbal inputs from the users due to their accents, which created a challenge for them to interact with the NPC. I took this as a scope of improvement and used other options for speech-to-text apart from Unity's SDKs. I collected verbal feedback from each participant about their experience and the areas of improvement in their opinion, what features they liked about the experience and features that were not helpful during the experience.

Overall, I found the study to be instrumental from the user study, in understanding the use case of VR and, most importantly, trying a new method of learning and training about consent. Though the user study was conducted with participants who had prior knowledge about VR as they were from the same university, it reinforces that this tool has potential. Currently, videos, card games, training and physical games are used to train and teach individuals about consent. Through this research, I explored a new avenue to help individuals learn and train themselves in verbal consent scenarios.

Age of the participants

As the study was conducted on adults aged 21-29 years, the shortlisted participants were selected from the same age bracket. The average age of the participants that were involved in the study was 26.6 years (Figure 23). They fit into the target audience group that I wanted to focus on as the scenario was based on real-life incidents that one can encounter at places like an office or public spaces such as a parking lot.

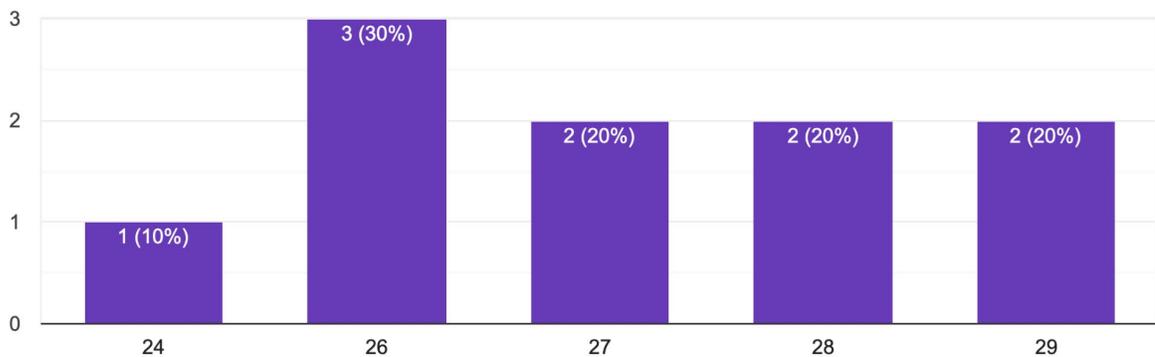


Figure 23: Age of the participants that were involved in study

7.2.1 Consent Education Prior To The Study

It was impressive to know that 9 out of the 10 (90%) participants were educated about consent in their life (Figure 24). The data collected showed the various channels through which they were educated about consent. The data shows that 50% of the participants were educated about consent by their parents, 30% at schools through their teachers, and 20% by family members like older siblings.

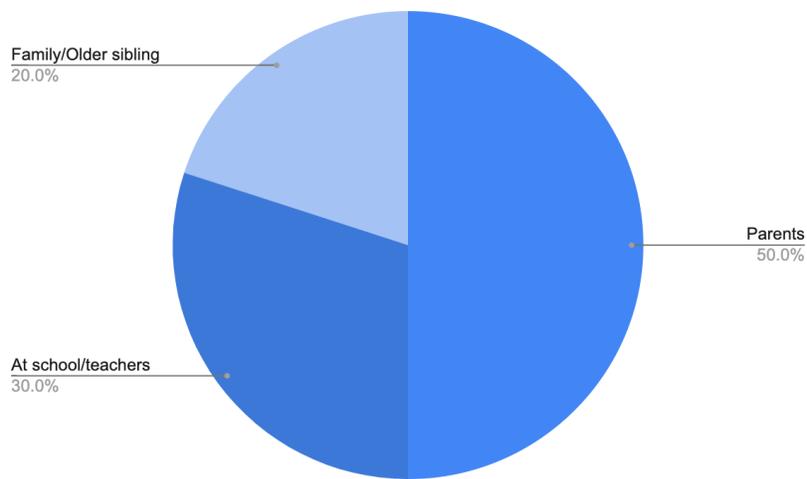


Figure 24: Methods through which participants were educated about consent prior to this study

Learning Through Vr

The participants were asked if they had received or experienced learning with the help of VR prior to the study (Figure 25). 70% of the participants had no prior experience using VR as a tool for education, and the remaining 30% had the opportunity to experience other learning experiences through VR. This helped them reflect that learning through VR has a long way to go as it is not adapted at a fast pace.

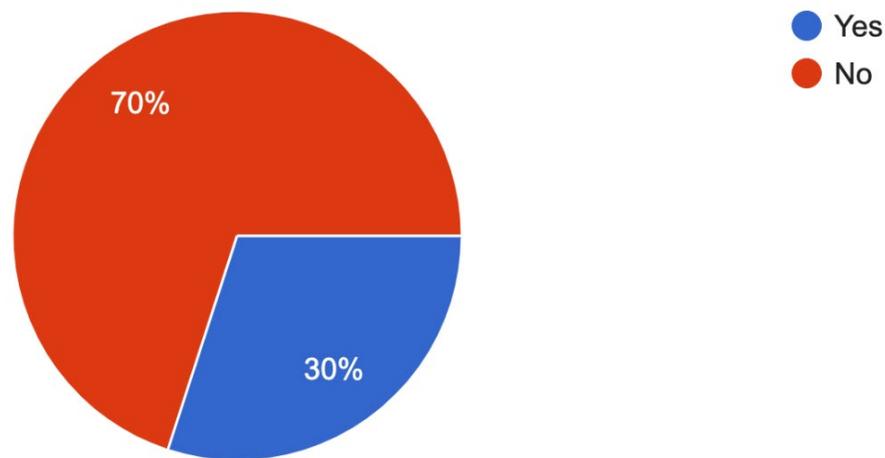


Figure 25: Prior experience of using VR as a method of learning/training

Opinion of using VR as a teaching and training tool

The question intended to gather the opinions of the participants on the use of VR as an educational tool prior to the experience. In the post-survey, this would help in understanding if the experience and study were in line with what they imagined and expected from a VR learning and training experience. All the participants, i.e. 100% of them, believed that VR could be used as a training and teaching tool (Figure 26). A potential limitation was that the study group was based on a student population that had prior experience in VR and was receptive to the technology.

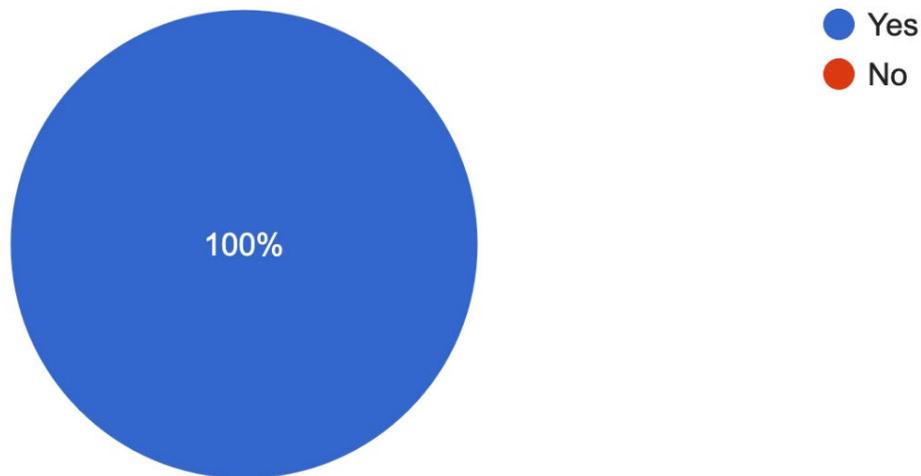


Figure 26: Participants' opinion to use VR as an educational tool prior to the study

VR scenario expectations

The participants were asked what their expectations of a scenario that is designed in VR for learning and training are. 70% of the participants expected it to be immersive, 20% expected it to be close to real environments/settings, and the remaining 10% of the participants expected it to be relatable to day-to-day life (Figure 27).

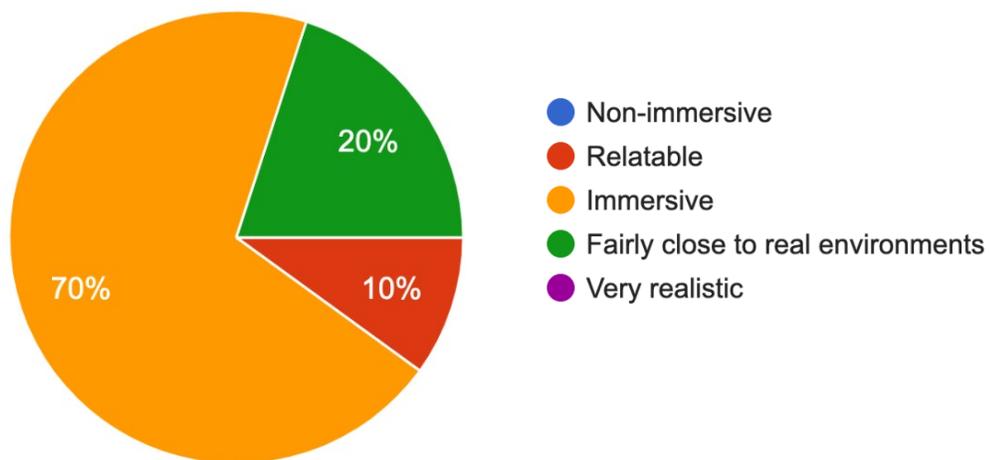


Figure 27: Expectation of the scenarios design for teaching and training in VR

Overall findings from pre-survey

The study was conducted on adults aged 21-29 years, with an average age of 26.6 years. 90% of the participants were educated about consent in their life, with 50% being educated by their parents, 30% by teachers, and 20% by family members. 70% of the participants had no prior experience using VR as a tool for education, and all the participants believed that VR could be used as a training and teaching tool. 70% of the participants expected VR scenarios to be immersive, 20% expected them to be close to real environments/settings, and the remaining 10% expected them to be relatable to day-to-day life.

7.2.2 Post-Survey Questionnaire Findings

Rating the experience based on immersion and learning about the topic

The participants were asked to rate the experience based on the level of immersion and its impact on learning. A Likert scale was used to assess these factors overall, with 1 being non-immersive and relatable and 5 being very relatable and immersive (Figure 28).

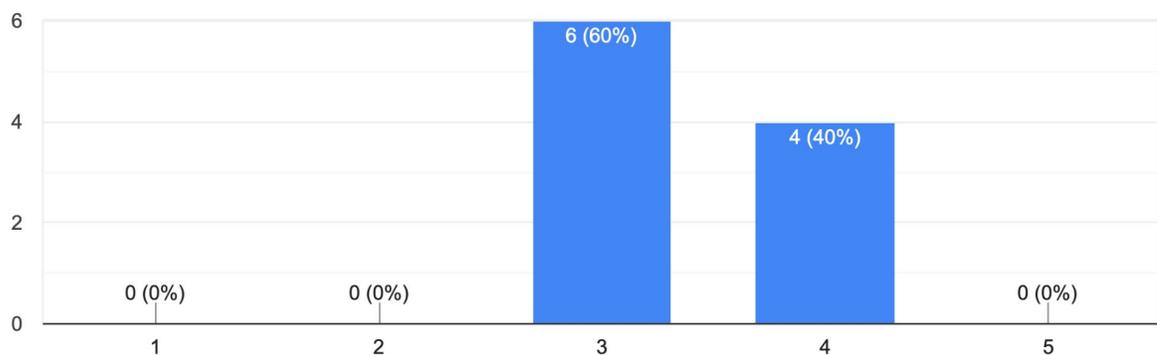


Figure 28: Level of immersion in the prototype and its impact on the learning process

Learning about consent through VR

The participants were asked if they had experienced learning through VR scenarios prior to this study, 80% of the participants had never experienced it, and the remaining 20% had the opportunity to do it prior to this study. After experiencing the verbal consent scenario 70% of the participants, neither agreed nor disagreed with learning about consent using VR tools. 30% of the participants agreed that they would prefer learning and practising scenarios in VR (Figure 29). This gave a positive push to the study that there is a scope for scaling the studies. There is a potential to use VR as an educational tool for helping individuals train and practice consent.

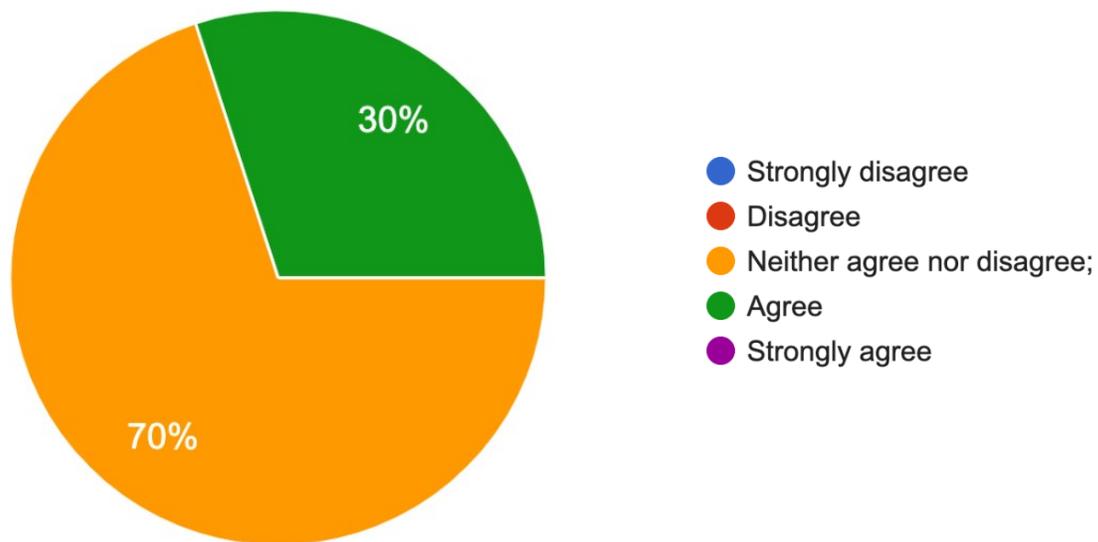


Figure 29: Participant's opinion about learning about consent through VR

Immersion and its impact on learning

Likert scale was used to understand the impact of immersion on the level of learning. The post-survey results showed that 70% of the participants found immersion based on

Zelter's API cube. It was helpful in facilitating the process of learning, and 30% of the participants found it acceptable to have immersion as a part of learning and training in VR about verbal consent (Figure 30).

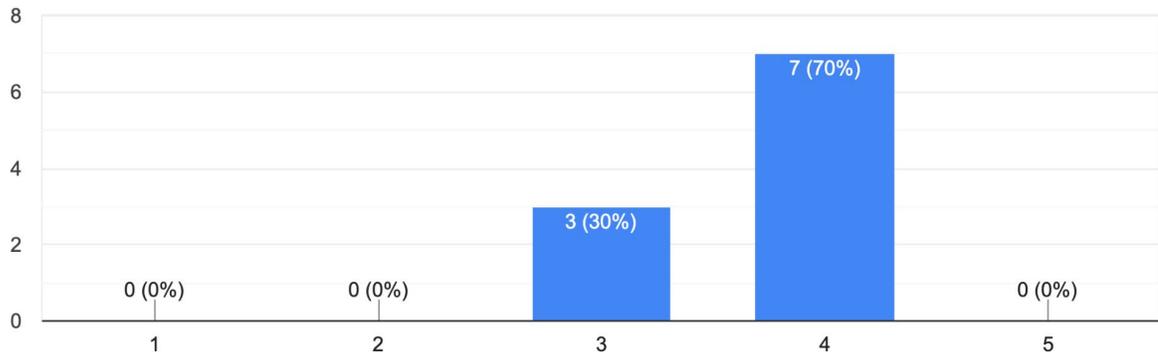


Figure 30: Participant's opinion about learning about consent through VR

Control and immersion for better learning and impact

The question focuses on understanding if participants would have had a more impactful learning experience if they had more immersion and control. 60% of the participants wanted more control and immersion to learn about verbal consent scenarios, and 40% disagreed as they found the level of immersion and control satisfactory to achieve the goal of learning and training in consent scenarios (Figure 30).

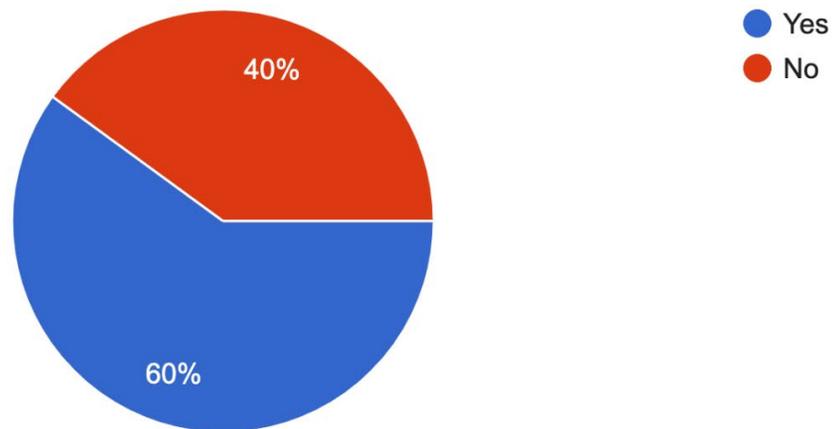


Figure 31: Expectation of the level of immersion and control for learning and training

Conversation interaction as a feature for learning

As the experience involves conversation as one of the tools for learning, it is the method of communication between the NPC and the user. The results show that 50% found learning and practising verbal consent very helpful. The other 50% of the participants found it extremely helpful (fig. 11).

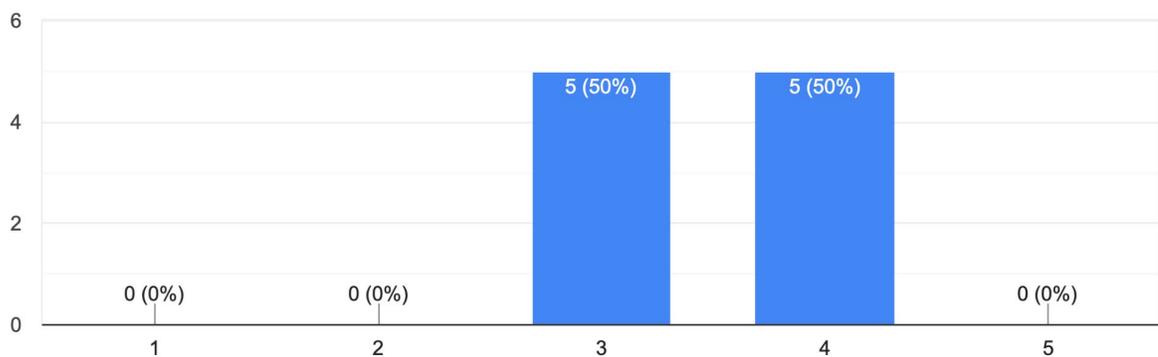


Figure 32: Impact of the conversation training tool

VR as a learning tool for verbal consent scenarios

Participants were asked about their opinion of using VR as a learning tool for verbal consent scenarios. 80% of the participants showed their willingness to use VR as a learning tool, and 20% of the participants neither agreed nor disagreed (Figure 32).

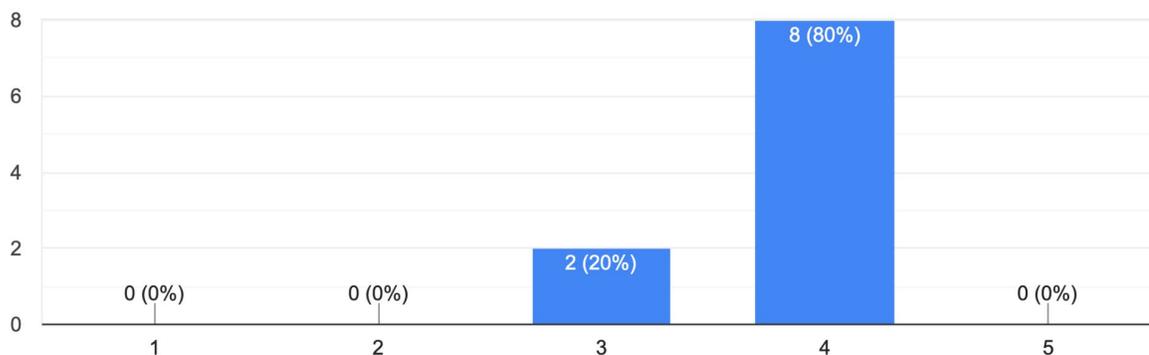


Figure 33: Using VR as a learning tool to learn about daily consent scenarios

Overall findings from post-survey

The study found that the participants, who were aged 21-29 years and had prior education about consent, were receptive to the use of VR as an educational tool for learning and training about consent. While 70% of them had no prior experience using VR as a tool for education, 100% believed that VR could be used for teaching and training. 70% of the participants expected the VR scenario to be immersive, and immersion was found to help facilitate learning for 70% of participants. Furthermore, 60% of the participants wanted more control and immersion in learning about verbal consent scenarios. Half of the participants found the conversation interaction tool very helpful, and 80% showed their willingness to use VR as a learning tool for daily consent scenarios.

Overall, the study suggests a potential for using VR as an educational tool for helping individuals train and practice consent.

Overall, through designing prototypes and user testing, I have achieved the goal I had set out for myself and now have a sense of confidence to continue this study and build a tool that the masses could use at some point. This research process has taught me a lot, and I have better clarity on taking this research to the next step.

7.3 Reflection

The thesis aimed to fill a gap in the sex education space and build a tool that could facilitate the process of individual learning and practice consent without hesitation. Also, exploring VR as a tool in this learning and training process. The outcomes were assessed from user testing and gave a positive output that VR can be used as an educational tool in the consent space. As per the user findings, participants did find it instrumental as a process to practice consent. The interactive tool allows users to make decisions and receive feedback. The intention behind the thesis was to help build/develop empathy in people towards each other and help individuals learn to say 'no' and accept 'no' as an answer. This thesis provides an important example of how immersive technology can facilitate learning and education.

Reflecting on my thesis paper, I am reminded of my initial motivation for the project - to fill a gap in the sex education space. I wanted to create a tool that could make a difference in how consent is taught, and I saw the potential for technology to be a powerful medium for achieving this goal. As I delved deeper into the project, I pushed the boundaries of my

technical knowledge, constantly iterating and refining the tool until I felt it was ready to be shared with the world.

I detail my design of dialogue trees integrated into a virtual reality (VR) environment to create a conversational experience. This allowed users to interact with a non-playable character (NPC) and practice verbal consent, thereby addressing my first research question: how can an immersive virtual environment with a conversational tool facilitate learning and practice of the nuances of consent. The user testing phase provided me with valuable insights into the tool's capabilities and areas for improvement, which are relevant to the second research question: whether VR can be an effective educational tool based on existing consent frameworks, as suggested through my user feedback.

This thesis project was a great learning experience. It pushed me to expand my technical knowledge and develop a tool that could potentially fill a gap in the sex education space. I was motivated by creating something to help people learn about consent in a safe and secure environment. Through the course of this project, I transformed my ideas into an interactive tool with the potential to help users understand, practice, and learn about consent.

Looking back on the process, I am proud of my accomplishments. Hopefully, educational institutions, parents, and offices can use the tool I created to help individuals learn about consent in a safe and secure environment. Through interactive scenarios, users can explore and practice navigating conversations around consent, recognizing when

someone is not giving consent, and effectively communicating their feelings and boundaries.

As I wrote my thesis paper, I began to realize the potential implications of the tool. It could help reduce the stigma around consent while empowering individuals to navigate these conversations more effectively. By building empathy towards each other and learning to say 'no' and accept 'no' as an answer, individuals can build healthier relationships and create a safer environment.

Overall, my thesis paper serves as a reminder of the power of technology to facilitate learning and education. The outcome has inspired and motivated me and given me hope that it can positively impact how consent is taught. It has been a challenging but rewarding journey, and I am excited to see how the tool I have created can be further developed to make an even more significant impact. I believe this tool can provide users with a significant learning opportunity and help reduce the stigma around consent.¹²

Chapter 8: Conclusion

The thesis was motivated by a desire to fill a gap in the sex education space. I wanted to create a tool that individuals, educational institutions, parents could use, and offices to make a difference in how consent is taught. With technology quickly advancing, I needed to push the boundaries of my technical knowledge and create a tool that could help people. After numerous iterations, the thesis has now been transformed into a tool that

¹² It is recognised that not everyone has access to VR headset and maybe not be able to experience the consent scenarios

can serve as a base and be built upon to make a positive impact. Through this tool, users are presented with scenarios that help them understand how to navigate conversations around consent, recognize when someone is not giving consent, and effectively communicate their feelings and boundaries. This thesis explores the potential implications of the tool and how it could help reduce the stigma around consent while educating and empowering individuals to navigate conversations around consent more effectively.

8.1 Scope And Limitations

Developing a project to push my technical boundaries and building it with the vision of creating a positive impact was challenging. The project was limited to a specific time frame, so certain features and functions could not be implemented. This also caused the project to be limited in terms of the intended overall vision, so the final product could not be experienced in its entirety. As I had no prior experience designing on any gaming platform, it was an intense learning process for me as I had to try several engines to find the best one that suited the experience best. I wanted to design the experience to be more immersive and add a level of complexity to make the experience more seamless and bring it closer to a real-life scenario, which was not possible due to the lack of time as well as technical limitations.

Finally, finding larger sets of users for user testing was impossible due to the lack of time and hardware limitations. The user study was limited to the cohort, and they had an initial idea about the project and knew me as we were studying at the same university. Even though the answers were not monitored, the answers could be influenced as they were

aware of the studies as well as they are equally exposed to technology versus people with a lack of technical knowledge.

8.2 Future Goals And Outreach

The overarching theme of consent is sex education, and we still have to catch up on the methods and techniques of teaching consent to people. The work detailed in this thesis has only begun to scratch the surface of trying immersive teaching methods and learning about consent. I want to build further iterations and incorporate the following:

- Design a more immersive environment by giving the user a body in VR so that they could use hand gestures beyond verbal use.
- Developing more realistic scenarios with the help of sex educators and giving the research a more holistic approach
- Providing the user with the agency to walk around to explore the environment as well as walk away from the experience as and when they want by providing them with additional UI options
- Expressions play an essential role in understanding what the other person feels like or is feeling in a particular scenario. This would not only help make the experience close to real-life scenarios but might also be another aspect that describes if the person is interested or not or if in giving consent, which is more likely to happen in real-life scenarios
- Designing a more complex dialogue tree would help users practice and learn better

Adding scenarios for role play, where users could switch sides. The initiator becomes the receiver and vice versa. This adds a level of learning by shifting perspectives and may help people understand and empathise with one another when they are in similar situations

It would also be interesting to design the tool for different age groups and help facilitate the learning process and help bring empathy towards one another. Overall I would like to refine the tool to be more user-friendly, immersive and compelling.

8.4 User Feedback From Graduation Show

The graduation show allowed showcasing of the prototype to a larger audience and collecting overall informal feedback about the prototype. The users found the tool instrumental and shared feedback to enhance it. The feedback included:

- Providing more immersion by allowing the user to explore the scenario by walking around. As well as providing them with a character body in the scenario
- Making the conversation more complex as it would bring it closer to real-life scenarios
- Adding facial expressions to the NPC could make it more relevant
- A few users expected the NPC to walk away when the conversation ended with them not giving consent

Based on these feedbacks, I look forward to exploring these nuances in my next research and incorporate the suggestions to bring the tool closer to its goal.

8.5 Final Thoughts

This project has helped me learn and achieve the goals I had set for myself academically and personally. I see this project transforming into something bigger and would like to continue the research to one day make this tool available for everyone who wants to learn and practice consent. I would like to see this grow so users could get in touch with sex educators in the Metaverse, talk to them and learn with them.

I captured and worked on the academic goal of gaining knowledge in the domain that excites and inspires me. Technology is versatile and gives me hope that when put to the proper use can help bring a positive change and create a positive impact.

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Appendices

Appendix A: Participant Screening Form



INVITATION

The research 'An Exploration of using an Immersive Virtual Environment with a conversational role play training tool to help Individuals Learn about Verbal Consent in Day-to-Day Scenarios' is led by Preeti Mahajan. This project aims to explore role-exchange playing in immersive virtual environments to help individuals learn about verbal consent in daily verbal scenarios. The participants will be able to experience scenarios in a virtual environment and interact with a virtual assistant to practice and understand verbal consent.

As a part of the research, I seek your help gathering information about your understanding of 'verbal consent. I invite interested candidates to participate in this research to give feedback on Virtual Reality (VR) scenarios, their experience of role-playing in VR and its elements. Please respond to the survey ([Appendix D](#)) to help us to plan our workshop([Appendix E](#)). Many thanks for your help!

WHAT'S INVOLVED

A form calling for participants will be sent across, which will help to shortlist eligible participants. Upon the successful shortlisting of 10-20 participants, they will be given a survey containing 7-10 questions before the experience to understand the participant's previous learning experiences in a VR environment. The survey will include questions about past experiences in a VR environment for learning.

The participants will use the VR headset to experience the research, and upon completion, they will be provided with an exit survey to give their inputs on the experience and in case they have suggestions to enhance the experience.

The surveys and forms capture the participant's name, which will be indexed to data on this consent form which will be shared and stored separately on a secured drive. Completing each survey is expected to take around 5-7 minutes.

POTENTIAL RISKS AND BENEFITS

There also may be risks associated with participation. Increased attention surrounding your own work may increase the risk of a negative response. However, we anticipate this risk will be minimal.

Possible risks of participating include:

- Exposure to virtual reality can disrupt the sensory system and lead to symptoms such as nausea, dizziness, sweating, pallor, loss of balance, etc., which are grouped together under the term "virtual reality sickness".
- Temporary discomfort due to the use of the VR headset
- Content viewed using the product can be intense, immersive, and appear very life-like and may cause your brain and body to react accordingly.
- Certain types of content (e.g. violent, scary, emotional, or adrenaline-based content) could trigger increased heart rate, spikes in blood pressure, panic attacks, anxiety, PTSD, fainting, and other adverse effects.
- Prolonged, uninterrupted use of the product should be avoided. It may negatively impact hand-eye coordination, and balance, and/or cause other negative effects.

Possible benefits of participating include:

- The opportunity to contribute to the research and help in building a better model.
- The ability to influence and inform future research in VR learning systems and technologies.
- The opportunity to speak to other potential contributors in the area of this research.
- Can help build a positive impact on their behaviour
- Outcomes from this study can bring new audiences to your own work, and potentially boost its positive profile.
- It is possible that you will not experience any or all of the potential benefits or risks listed above.

CONFIDENTIALITY & ANONYMITY

This survey collects such as names of the participants and email addresses (not mandatory). The material generated by the survey will not be confidential and raw data will be kept confidential. This raw data identifies survey respondents by name. This personal data will be kept on a password-protected, encrypted USB key or hard drive by the project PI for a maximum of seven years post-study. The project website will be shared with the general public.

VOLUNTARY PARTICIPATION

Participation in this study is voluntary. You may decline to answer any questions and/or participate in any study component. You may decline to have your image taken. You may decide to withdraw from this study at any time before February 29, 2023. If you choose to withdraw from the study your data will be destroyed.

PUBLICATION OF RESULTS

The results of this study will be published in the thesis document.

CONTACT INFORMATION AND ETHICS CLEARANCE

If you have any questions about this study or require further information, please ask. If you have questions later about the research, you may contact the Principal Investigator, Dr Alexis Morris, using the contact information provided on this form. This study has been reviewed and received ethics clearance through the Research Ethics Board at OCAD University [insert REB approval #]. If you have questions regarding your rights as a participant in this study please contact

Research Ethics Board c/o Office of the Vice President, Research and Innovation

OCAD University

100 McCaul Street

Toronto, M5T1W1

416 977 6000 x4368

research@ocadu.ca

Appendix B : Calling For Participants Form

Seeking participants for a Virtual Reality based research experience

Are you 18+ years of age? *

- Yes
 No

Will you be able to be present in person in Toronto, Canada, to be a part of this research? *

- Yes
 No

Do you have a history of negative physical or psychological issues? *

- Yes
 No

Are you currently using any medication prescribed by your therapist/ psychiatrist? *

- Yes
 No

Do you have any visual impairments, such as color blindness, partial blindness, etc.?

- Yes
 No

Do you fall under any of these categories? Pregnant, elderly, or have pre-existing conditions that may affect your virtual reality experience such as vision abnormalities, psychiatric disorders, heart conditions, or other serious medical conditions?

- Yes
 No

Submit

Clear form

Appendix C: Participant Consent Form



Consent Form

I agree to participate in the study described above. I have made this decision based on the information I have read in the Consent Form (above), and confirm my ability to provide Consent. I have had the opportunity to receive any additional details I wanted about the study and understand that I may ask questions in the future. I understand that I may withdraw this anytime before February 29, 2023.

General Participation

- Yes, I consent to participate in this study. I understand that all resulting process and prototype documentation (including questionnaire responses) will not be confidential and may be published in reports, professional and scholarly journals, conferences, presentations, online project documentation, and social media.
- No, I do not wish to participate in this study.

Attribution

- Yes, I wish to receive attribution for my contributions. You may use my name as listed below alongside images I generated, either directly or in collaboration with an event illustrator.
- No, I do not wish for my name to be used in images generated by my participation in this event.

Images of You

- Yes, I consent to appear in photographs, illustrations and/or other images that will be shared with other participants and may be published in reports, professional and scholarly journals, conferences, presentations, online project documentation, and social media,
- No, I do not consent to appear in photographs, illustrations and/or other images.

Name: _____

Signature: _____ Date: _____

Thank you for your assistance in this project. Please keep a copy of this form for your records.

Appendix D: Research Protocol

Research Protocol

Principal investigator(s): Dr. Alexis Morris

Timeframe: Fall 2022- Winter 2023

Type: Virtual Reality (VR) experience

Research team: Dr. Emma Westecott, Ms.Preeti Mahajan

Scheduling:

1. **Workshop 1 on 30th January 2023 from 10:00 AM to 1:00 PM.** Five shortlisted participants will be invited to experience the VR environment and complete the survey before and after the experience.
2. **Workshop 2 on 2nd February 2023 from 10:00 AM to 1:00 PM.** Five shortlisted participants will be invited to experience the VR environment and complete the survey before and after the experience.

Research Question: How can an Immersive Virtual Environment with a conversational training tool help Individuals Learn about Verbal Consent in Day-to-Day Scenarios? Based on consent education frameworks, the research explores verbal consent scenarios that will be built in a Virtual Reality (VR) environment, and users can interact and practice verbal consent.

Research Objectives: The research explores the concepts and mechanisms of Virtual Reality (VR) as a technology that can help facilitate the sense of embodiment for a user to understand and learn about their actions in a verbal consent scenario. Verbal consent is a complex and often misunderstood concept. The research will explore the concept of consent, its social implications, and how it can be best understood and applied in different situations. This might help users apply the learnings in their day-to-day experiences and help them understand the concept better, as VR gives them a safe space to practice.

Equipment & Supplies

- [] Consent forms
- [] Contact information for participants
- [] Notebook, sketchbook and pen for note taking (recommended for investigator)
- [] Online repository for file transfer and archiving
- [] Oculus Quest 2 (VR headset)

Guide

Before the experience:

1. Participants are invited and shortlisted by the Investigator based their age, profiles, and current social and mental health status, from the applicant pool responding to the call for participation ([Appendix B: Recruitment Material](#))
2. Participants are invited to participate in the research (1 week before the event) [Appendix C](#)
3. Participants are asked if there are any questions or need for clarification
4. Collect consent forms and videos [Appendix E](#)
5. Complete a pre-survey survey containing the following questions ([Appendix G](#))

After the experience:

Complete a post-experience survey containing the following questions ([Appendix H](#))

Appendix E: Pre-Survey Questionnaire

Section A: General Information of the participant

Name of the participant (optional)

Your answer _____

Age of the participant

Your answer _____

Email address (optional)

Your answer _____

Section B: Information about participant's experience in VR environments

Were you educated about consent at any point in life?

Yes

No

If yes, what was the method of teaching?

Your answer _____

Have you experienced learning in a Virtual Reality (VR) environment before? If yes, please answer question 3

Yes

No

If yes, then rate your experience. Poor (1) Very Good (5)

1	2	3	4	5
<input type="radio"/>				

In your opinion, can VR be used as a tool to teach adults and youth about consent?

Yes

No

How believable should a Virtual Environment be to learn?

Non-immersive

Relatable

Immersive

Fairly close to real environments

Very realistic

Submit Clear form

Appendix F: Post-Survey Questionnaire

Appendix H: Post-VR experience survey

Section A: General Information of the participant

Name of the participant (optional)

Your answer _____

Age of the participant

Your answer _____

Email address (optional)

Your answer _____

Section B: Information about the participant's experience after experiencing the prototype

How would you describe your experience on a scale of (1-5)

1 2 3 4 5

Would you prefer learning about consent through scenarios in VR?

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

Did immersion help you feel like you were in the scenarios? Poor (1)- Excellent(5)

1 2 3 4 5

Would you learn more about consent if you had more immersion and control?

Yes

No

How helpful was the conversation interaction as the process of learning? Poor (1), Excellent (5)

1 2 3 4 5

How comfortable do you find VR environments as a tool for learning? Poor (1), Excellent (5)

1 2 3 4 5

Submit Clear form

Appendix G: Unity Codes

```
VRSpeechToText.cs
Miscellaneous Files
keywordRecognizer

85 {
86     StartCoroutine(IamDoingGoodCR());
87 }
88 private IEnumerator IamDoingGoodCR()
89 {
90     AudioSource.clip = audioClips[1];
91     AudioSource.Play();
92     Prompts[0].SetActive(false);
93     Prompts[1].SetActive(false);
94     Prompts[2].SetActive(true);
95     yield return new WaitForSeconds(2);
96     Prompts[4].SetActive(true);
97 }
98 private void IDontWish(PhraseRecognizedEventArgs args)
99 {
100     StartCoroutine(IDontWishCR());
101 }
102 IEnumerator IDontWishCR()
103 {
104     AudioSource.clip = audioClips[2];
105     AudioSource.Play();
106     Prompts[0].SetActive(false);
107     Prompts[1].SetActive(false);
108     Prompts[2].SetActive(false);
109     Prompts[8].SetActive(false);
110     Prompts[4].SetActive(false);
111     Prompts[5].SetActive(false);
112     Prompts[6].SetActive(false);
113     Prompts[7].SetActive(false);
114     Prompts[9].SetActive(false);
115     Prompts[3].SetActive(true);
116     yield return new WaitForSeconds(2);
117     Prompts[5].SetActive(true);
118 }
119 }
120
121 private void ThatWould(PhraseRecognizedEventArgs args)
122 {
123     StartCoroutine(ThatWouldCR());
124 }
```

```
VRSpeechToText.cs
Miscellaneous Files
keywordRecognizer

16 // The dictionary to use for mapping keywords to actions
17 private Dictionary<string, KeywordAction> keywords = new Dictionary<string, KeywordAction>();
18
19
20
21 [SerializeField] GameObject[] Prompts;
22
23 [SerializeField] AudioSource audioSource;
24 [SerializeField] AudioClip[] audioClips;
25
26 private string text = "";
27
28 // Use this for initialization
29 void Start()
30 {
31     // Add the "Hello" keyword and the corresponding action to the dictionary
32     keywords.Add("I am doing Good", IamDoingGood);
33     keywords.Add("I don't wish", IDontWish);
34     keywords.Add("That would be great", ThatWould);
35     keywords.Add("I'm not interested", ImNotInterested);
36     keywords.Add("Latte", Latte);
37     keywords.Add("I had a change", IdaChange);
38     keywords.Add("Maybe", Maybe);
39     keywords.Add("No", No);
40     keywords.Add("Okay Fine", OkayFine);
41     keywords.Add("Please No", PleaseNO);
42
43     // Create the keyword recognizer with the dictionary of keywords
44     keywordRecognizer = new KeywordRecognizer(keywords.Keys.ToArray());
45
46     // Subscribe to the OnPhraseRecognized event of the keyword recognizer
47     keywordRecognizer.OnPhraseRecognized += OnPhraseRecognized;
48
49     // Start the keyword recognizer
50     keywordRecognizer.Start();
51
52     Invoke("PromptMethod", 2);
53 }
54 void PromptMethod()
```