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Project Deliverable K: User and Product Manual
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List of Acronyms and Glossary

Table 1: Acronyms

Acronym	Definition
GUI	graphical user interface
NPC	Non-playable Characters
VR	Virtual Reality
IET	Immersive Experience Tool

Table 2. Glossary

Term	Acronym	Definition
Graphical User Interface	GUI	A visual way of interacting with a computer using items such as windows, icons, and menus, used by most modern operating systems.
Non-Playable Characters	NPC	Is any character in a game that is not controlled by a player
Virtual Reality	VR	The computer-generated simulation of a three-dimensional image or environment that can be interacted with in a seemingly real or physical way by a person using special electronic equipment, such as a helmet with a screen inside or gloves fitted with sensors
Immersive Experience Tool	IET	Pulls a person into a new or augmented reality, enhancing everyday life (by

		making it more engaging or satisfying) via technology
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Introduction

This User and Product Manual (UPM) provides the information necessary for university students, and employers to effectively use the IET and for prototype documentation. This project was produced for Professor Hanan Anis and it is supposed to be an immersive experience tool that will help users to learn empathy. In this document, the client's needs, problem statement, support, and maintenance for the product, an instructional on how to use the product, and an instructional on how the project was made will be discussed at length. A product documentation is also included which will explain the design choices that were made. This document is to help first-time users or clients using our IET project. The first couple of sections will give an overview of the IET and contains the considerations, warnings, and instructional on how to use the IET. Lastly, the last couple of sections will discuss at length how the product was made, what equipment needed to be used, bill of materials, explanation of our design processes, the framework of the IET and a tutorial on how to recreate the project.

Overview

For years, experts in cognitive behavior and psychologist have been developing techniques to teach empathy. To teach empathy, one must put themselves in other people's shoes. Therefore, there is a need for a learning tool using virtual reality to enhance and foster empathy by allowing users to experience the lives of minority groups.

Our client's or users' needs are very specific. The experience they require needed to be compatible with VR consoles, interactive, and educational. A detailed list of their needs and statements can be found tabulated and ranked by importance below.

Table 3. Client Needs and Statements ranked by importance in a scale of 5

Question	Client Statement / Customer Statement	Interpreted Need
Typical Uses	➤ The experience is only compatible with virtual reality consoles.	5 4

	<ul style="list-style-type: none"> ➤ It is critical that the virtual experience makes a social impact on the user. ➤ The simulation needs to deliver an experience to the users that is convincing and an environment that they can interact with. ➤ It is important that the users experience different perspectives to train implicit bias and gain understanding of how other people live. ➤ The virtual reality experiences will be based on the childhood and current incidents of the panelists. Such experiences were incited due to their differences. ➤ Client 's purpose of using VR is to show how such experiences can affect and impact minority groups. 	<p>4</p> <p>4</p> <p>4</p> <p>4</p>
Likes	<ul style="list-style-type: none"> ➤ It is necessary that the virtual experience is dynamic and keeps the users engaged. ➤ To be fully immersive, it is important that the experience stimulates the users' sense of touch, hearing, vision, and even smell, if possible. 	<p>4</p> <p>4</p>
Dislikes	<ul style="list-style-type: none"> ➤ The experience is preferably not cinematic (not interactive). 	<p>3</p>
Suggested Improvements	<ul style="list-style-type: none"> ➤ The interface needs to be user-friendly to allow the users to use it as a learning tool. ➤ It is important that trigger warnings, closed captions, seizure warnings, or any accessibility aid are available if necessary. 	<p>4</p> <p>4</p>

Our product is different from others because ours was not only based on a true story which enhances the empathy for users but also sheds lights on the trials and tribulations of people who had to face prejudice and racism in their lifetime.

Pictures of the final prototype can be found below for each scene.



Figure 1: The Dorm Room Scene



Figure 2: The Bathroom Scene



Figure 3: The School Scene



Figure 4: The Cage Scene



Figure 5: The Living Room Scene

In this experience, the user can walk around to navigate the environment, have a 360 view of their surroundings, interact with the NPCs and their surroundings.

As stated before, this experience is VR-Compatible, so to be able to run this experience a VR headset may be required as well as a computer (Refer to Equipment list for minimum requirements). The experience itself was constructed in Unity and to access the game as a user one must have a unity log-in credentials.

Cautions & Warnings:

This product may cause dizziness and nausea due to the use of VR. The user may feel disoriented and sick from the quick movement. The simulation uses flashing lights and transitions which could be dangerous to some users who are prone to seizures. The simulation also uses dramatic scenes which could be disturbing to some users. Also, loud noises and alternating ear effects are used during the dialogue. The topics portrayed in this simulation about racism can be a sensitive topic for some users. If the user feels uncomfortable or sick at any time during the simulation, it is recommended to either take off the VR headset or exit the simulation.

*Before starting the VR, make sure to have space around and aware of your surroundings.

Getting started

Refer to the equipment list first to determine if your computer can run the experience.

1. Sign up or log-in in unity on www.unity.com or <https://id.unity.com/en/conversations/457782b1-c466-4671-9659-0b72e1a5ac20018f>. Click whatever option is applicable to you (if you are an existing user or new user)

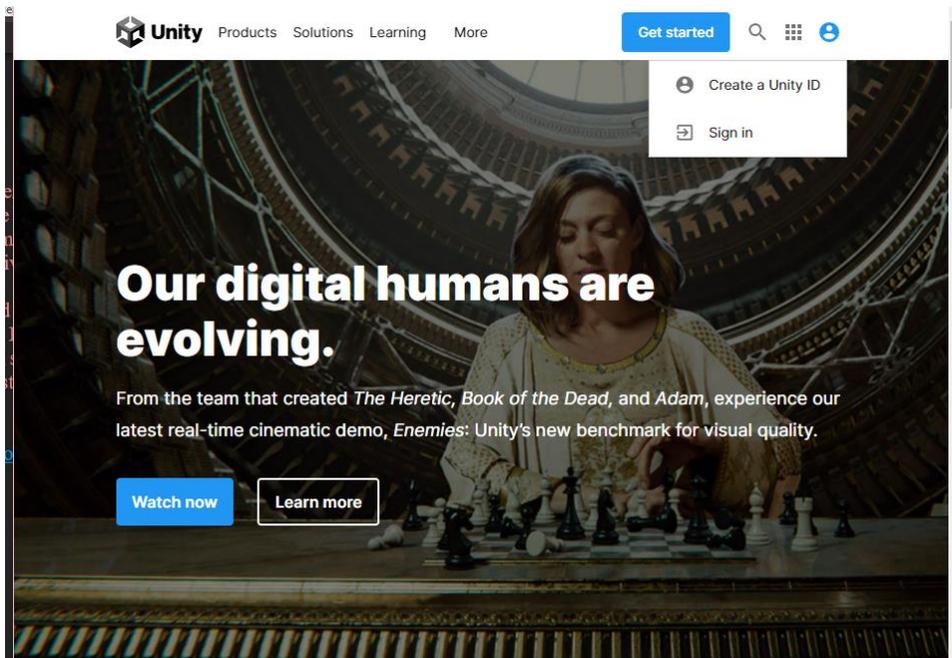


Figure 6: Homepage Unity and Log-in/Sign-in can be found on the top right corner of the screen.

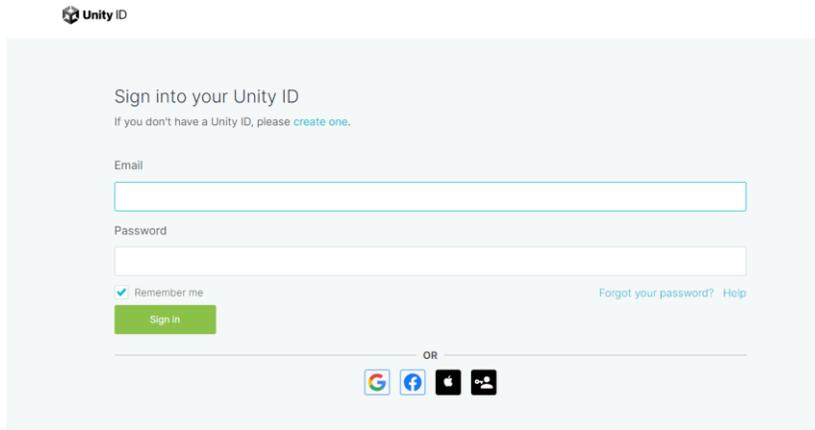


Figure 7: Log-in page for Unity (for existing users)

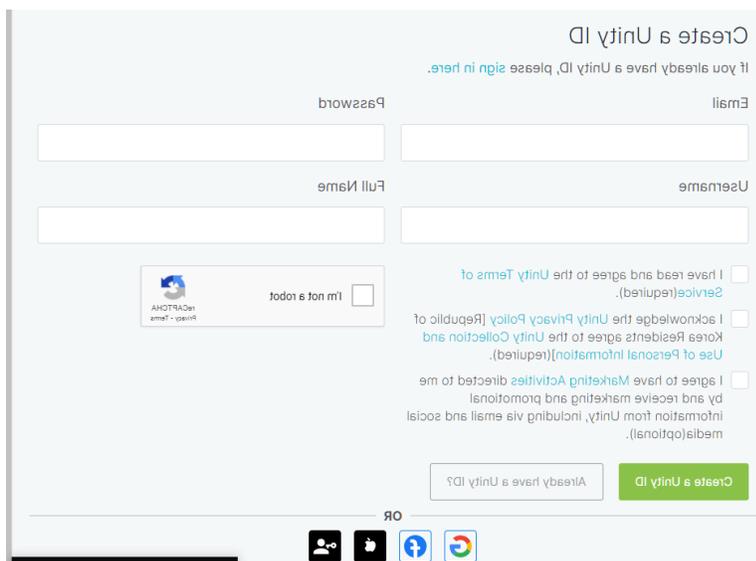


Figure 8: Sign-in Page for Unity (for new users),

2. Then click on Unity to enter the experience.
3. Set up your VR headset according to the console's instructions. A list of documents for set up instructions for VR headset is provided below in referenced documents.

Configuration Considerations

For users who are sensitive with sound, the product was provided with an option to lower the volume accordingly. This option can be found under setting in the starting menu, which will

be included in the future improvement. Also, in order for the scene to be switched, users can just right-click on the mouse and the scenes will be switched.

In order for users to know their character, the first scene, as shown in Figure 1, was provided with a mirror to which users can walk and see their character reflection. This will allow users to identify who they will be through this experience.

User Access Considerations

The product was designed for educational institutions on the level of post-secondary to use as a teaching tool for diversity training. Since the product contains strong language that reflect racism actions, it is recommended to be used by students aged fifteen years old and older. This will allow teenagers to walk in other people shoes and feel empathy towards such experience as this phenomenon was seen greatly among teenagers.

Accessing/setting-up the System

When users log in Unity, they have to click on the appropriate file to run Unity. Once Unity starts running, users should press play in order to start the immersive experience, as shown in Figure 9.

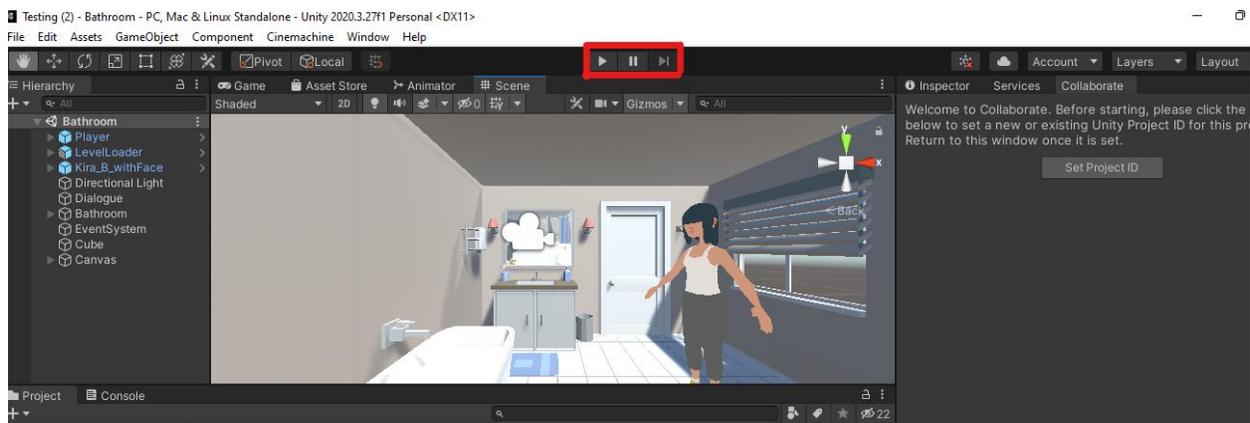


Figure 9: How to start the immersive experience.

System Organization & Navigation

The whole system is separated by scenes. Due to lack of time, we were not able to create a menu for all of this to be organized. However, in each scene we added a code that switches the scene by **clicking the RIGHT MOUSE BUTTON**.

Exiting the System

Since the log out menu was decided to be created in the future due to lack of time, the only way out of the application is if you **press ALT + F4** on the keyboard.

Using the System

The following sub-sections provide detailed, step-by-step instructions on how to use the various functions or features of the experience. Refer to the Input controls shown in Table 4. The experience will run automatically based on how long the user has been in the scene. Sounds and animations will not be dependent on any input controls, so users' only responsibility is to move around the scenes and switch the scenes.

Table 4. Input Controls and their following outputs

Input	Output
RIGHT MOUSE BUTTON	Switch scenes
W	Forward
A	Left
S	Back
D	Right
Mouse Movement	Camera Orientation

Troubleshooting & Support

Error Messages or Behaviors

If the user cannot look around with their VR headset, then there is a possibility that the headset is not paired to unity properly. A possible correction is going to the application of the

headset and turning on the 3rd party applications button. If unity is not opening properly try contacting unity assistance on their website. If any other unknown errors occur, please feel free to contact the developers.

Maintenance

There is no maintenance required for this product because it is compatible with all versions of Unity if a new version of Unity is created, please contact the developers to see if it is compatible.

Support

In case of any complications or support, you can reach the following via email from 10:00am to 5:00pm (GMT-4).

Cockburn.....	Bradley	Bcock030@uottawa.ca
Barkoudeh.....	Mishleen	mbark008@uottawa.ca
Huynh.....	Thai	nhuyn061@uottawa.ca
Cubid.....	Mackenzie	Mcubi053@uottawa.ca

Product Documentation

The main menu environment was 3D model import from unity asset store. This 3D model allowed having a complete environment for the dorm room scene, the bathroom scene and the living room scene, as shown in Figures 1, 2 and 5, respectively. This 3D model cost \$9.99 but it brings down the time to construct such a huge environment for this limited time project.

School environment was imported from unity asset store to help minimize the time to construct such model, as shown in Figure 3.

Characters in the scenes were also purchased and imported through unity asset store. These characters came with ready-to-animated form and with a variety of movement, this allow the school scene to be more realistic with each character doing different movement.

In order to add actions and movements to the scenes, coding scripts were written, as shown in the Appendix II. The scripts were written for the movement of the main camera, the movement of the characters and switching scenes. The reason behind writing the script can be illustrated as flows:

The script for the main camera was done in order to attached it to the main character, resulting in the scenes to be from a first-person perspective. For the movement of the characters, the script will allow users to move the character around to do actions or navigate the environment using W, A, S and D buttons. Finally, the script for switching the scenes allowed users to move between scenes by right clicking on the mouse.

<Subsystem 1 of prototype>

BOM (Bill of Materials)

Table 5. Bill of Materials with their price and respective links.

Asset	Cost	Link
Low Poly Cartoon House	\$ 9.99	https://assetstore.unity.com/packages/3d/props/interior/low-poly-cartoon-house-interiors-167425
School Assets	\$ 0	https://assetstore.unity.com/packages/3d/environments/school-assets-146253
Adiar	\$4.99	https://assetstore.unity.com/packages/3d/characters/humanoids/humans/adiar-lowpoly-character-125079
Distant lands	\$0	https://assetstore.unity.com/packages/3d/characters/distant-lands-free-characters-178123
Lean Localization	\$0	https://assetstore.unity.com/packages/tools/localization/lean-localization-28504
Kira	\$4.99	https://assetstore.unity.com/packages/3d/characters/humanoids/humans/kira-lowpoly-character-100303#publisher

Total:	\$22.9 8
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Equipment list

To recreate the product, a list of equipment can be found below.

1. A Computer
 - a. Windows 7 SP1+, 8, 10, 64-bit versions only;
 - b. Mac OS X 10.12+; Ubuntu 16.04, 18.04, and CentOS 7.
2. A GPU
 - a. Graphics card with at least DX10 (shader model 4.0) capabilities.
3. Unity Hub Software
 - a. Unity version 2020.3.27f1
 - b. Android Compatibility

Instructions

As explained in the in “Getting started” section, in order to use unity, the users must sign up for an account. Then they should use their user ID to sign into Unity, as shown in Figures 6, 7 and 8. When starting Unity, user must select the file that include the desired project, as shown in Figure 10.

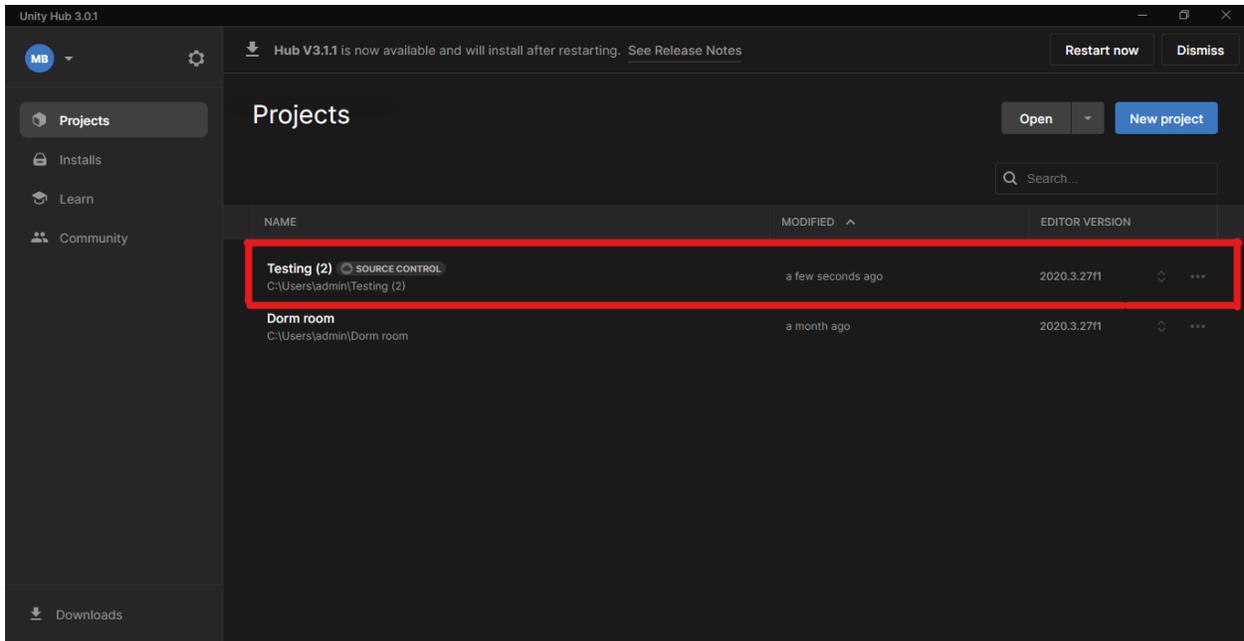


Figure 10: Selecting the project file.

When opening the project file, the build in scenes will appear on the screen. The materials that were used to design the scenes were purchased from the assets store. This was done by click on

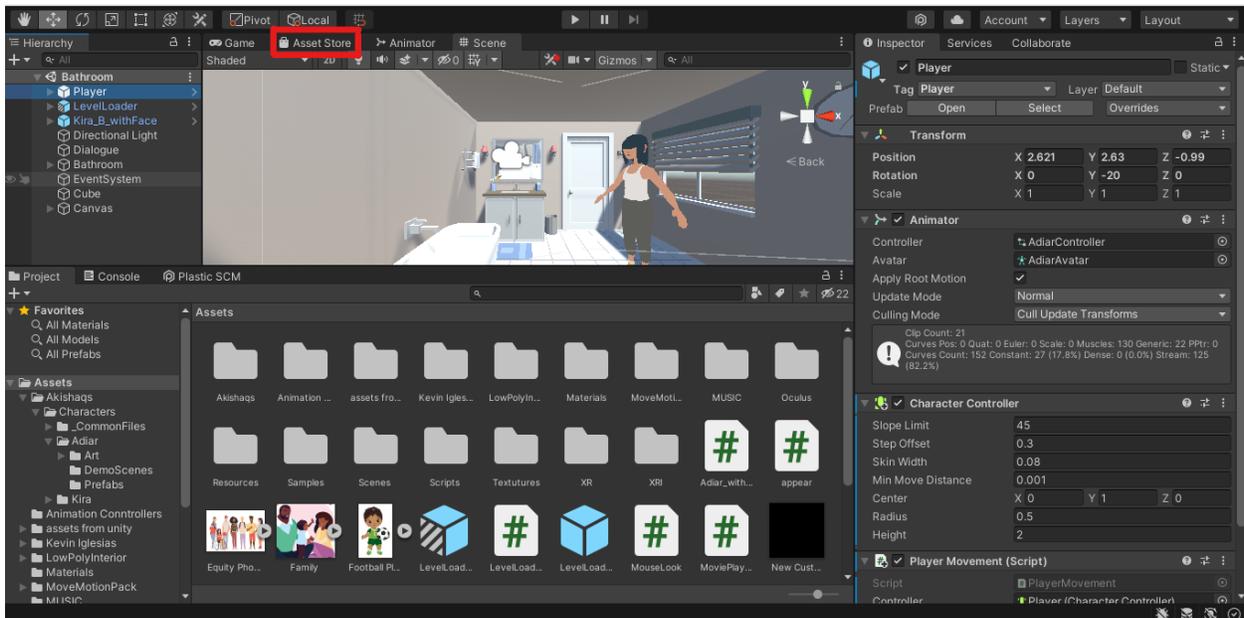


Figure 11: Buying the assets.

the asset store, as shown in Figure 11.

When clicking on the “Asset Store”, the purchases will be done by searching the assets online, as shown in Figure 12.

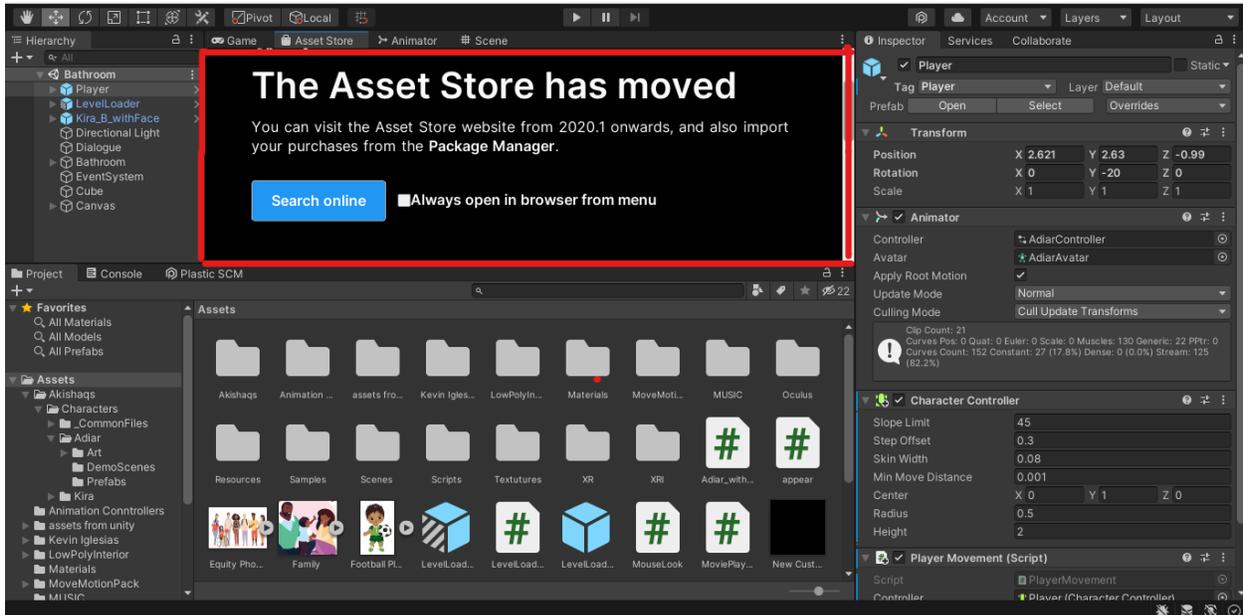


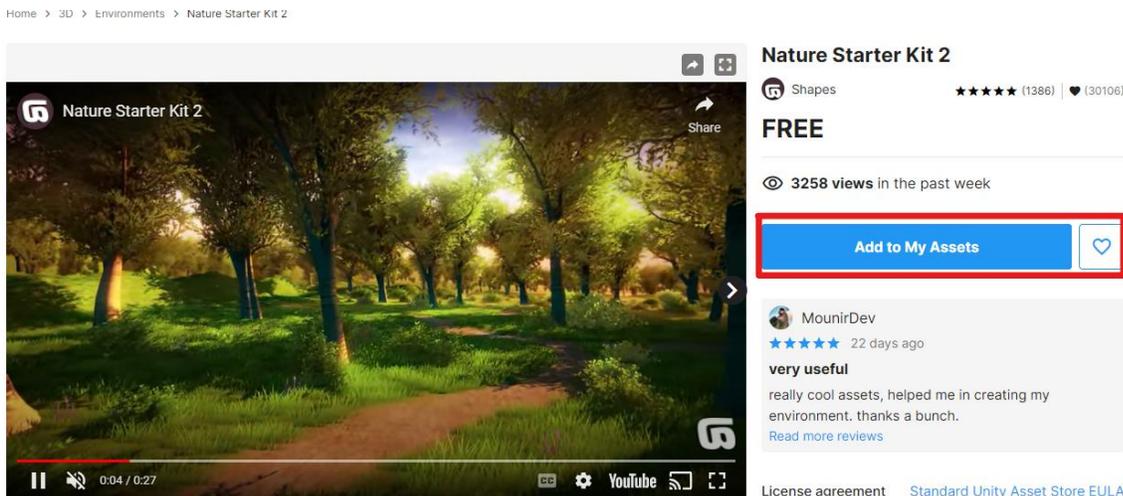
Figure 12: How to search the assets.

After

searching

t

Figure 13: How to add to "My Assets"



he required asset, the asset will be either purchased and add it to the assets in Unity, or just being added to the assets in Unity in case it was for free, as shown in Figure 13.

When going to Unity, users can check their assets under project tap. In order to play the build in scenes, users must click on the play button as shown in Figure 9.

As explained in “Using the system” section, users will only be able to input what was illustrated in Table 4.

Testing & Validation

Table 6. Summary of Testing Plan

TE ST ID	Test objective (why)	Description of Prototype used and of Basic Test Method (What)	Description of Results to be Recorded and how these results will be used (how)	Estimated Test duration and planned start date (when and how long)	Test Observations And results
1	<p>Are we able to pick up object?</p> <p>This will help us add interactivity to our experience.</p>	<p>A draft script and a game object. Test by interacting with object.</p>	<p>Object will be in game players “hand”</p>	<p>We will not be focusing on this anymore</p>	<p>Instead of this way of using interactivity we will use buttons to connect with the dialogue</p>
2	<p>Can we select a button that will start the scene?</p> <p>The button is needed to switch the scene and progress the story so the user is in a different scene.</p>	<p>A draft script for button. Test by clicking button.</p>	<p>The starting button allows users to start experience the plot that is chosen for the video.</p>	<p>Start: Friday March 16th Test duration: 30 minutes</p>	<p>Yes, when a button is pressed by clicking the mouse it will switch the scene and continue the story</p>
3	<p>Can we select the button to end the application?</p>	<p>A draft script for button. Test by</p>	<p>Can click quit button to exit</p>	<p>Start: Friday March 18th</p>	<p>After the whole experience is</p>

	<p>After the experience is over, we need something to show the user it is over.</p>	<p>clicking button.</p>		<p>Test duration: 30 minutes</p>	<p>over and there are no scene to play then the next click of the mouse button goes and fades to black.</p>
4	<p>Will the scenes be able to transition smoothly?</p> <p>We want to simulate a blink when switching scenes so that it does not feel choppy going from scene to scene.</p>	<p>Transitions from scene to scene by a draft script saying from right clicking mouse.</p>	<p>Scripts to make the scenes change when an action happens</p>	<p>Start: Friday March 11th</p> <p>Test duration: 30 minutes</p>	<p>Able to move scenes with a click of a button and in between each scene it fades to black.</p>
5	<p>Will selecting a poster make it zoom in?</p> <p>The posters in the room need to be interactable so the user can get background information about the character and who they are.</p>	<p>A draft script for button, and it pop up if button is clicked. Test by clicking button.</p>	<p>This option allows users to interact with the posters added to the video by clicking on the posters.</p>	<p>Start: Friday March 18th</p> <p>Test duration: 30 minutes</p>	<p>We did not have enough time to implement this. We believe this would be a good feature to the game so in the future this could be a</p>

					possibility to add this.
6	<p>When clicking one option for dialogue trigger, will a different dialogue from another Character be shown?</p> <p>The dialogue will run smoothly and be easy to follow to help get our message across.</p>	<p>A draft script for button, and it pop up if button is clicked. Test by clicking button.</p>	<p>The response of the characters will depend on the option that the user will choose for the dialogue trigger. Dialogue, the other characters will respond</p>	<p>Start: Friday March 18th</p> <p>Test duration: 30 minutes</p>	<p>We decided to go a different route and use audio dialogue, so the user is more immersed in the experience. Instead of having the user click to respond to dialogue we made pauses in the audio for the user to respond. In the future we will try to implement dialogue boxes for the characters thoughts.</p>

7	<p>Will tutorial boxes pop up on screen after we select game?</p> <p>After the start we need a way to show the user how to control their character so that they don't need to focus on that and can focus on the story.</p>	<p>A draft script for text so that an explanation pops up when the user gets close to an item</p>	<p>The tutorial box helps users go through the steps and actions they need to take in each scene.</p>	<p>Start: Friday March 18th</p> <p>Test duration: 30 minutes</p>	<p>We did not have time to implement this feature because we decided it was not the most important in the future this could be a feature added.</p>
8	<p>Will interacting with remote (gameobject) turn the TV on?</p> <p>Will the Tv show relevant information</p>	<p>A draft script that allows users to pick an object (e.g TV remote). Also, a draft script that will turns on the TV immediately after the user pick up the object.</p>	<p>By clicking on the on/off button on the remote, the user will be able to turn on the TV.</p>	<p>Start: Friday March 18th</p> <p>Test duration: 30 minutes</p>	<p>We decided to put a placeholder image for now but will look into making it a video</p>

Conclusions and Recommendations for Future Work

Finally, this product has been created from the use of stories that have happened in real life. We have learned that these events of racism do occur in day-to-day life, and we tried to express that in our product. We learned how to create with unity and use different aspects such as

coding and assets to create what we have envisioned. This helped us portray the empathy we needed and create what was expected. If other groups were to work on this product, we suggest starting by watching unity’s tutorials on implementing VR development. Then come up with a plan to add new features or scenes to the product. More improvements can be added to make the experience flow better and have options to make the final product feel more realistic.

If we had a few more months, we would consider adding more interactivity and extra language option to our product. We would add more implantation to VR as in picking up items and using them. We could also change the dialogue to be based on proximity so that when the user walks into a certain spot then it triggers the dialogue. The options we could add are a start screen and options for subtitles and sensitivity and anything else that would improve the user’s immersion in the experience. If we wanted to take this project further, we could add different experiences from other real-life experiences. Overall, we think the product design went very well and we think this product could potentially be used to inspire empathy in schools and other environments with more work.

APPENDICES

APPENDIX I: Design Files

Table 7. Referenced Documents

Document Name	Document Location and/or URL	Issuance Date
Getting Started with your Oculus	https://support.oculus.com/landing/getting-started/landing-getting-started	N/A
House environment	https://assetstore.unity.com/packages/3d/props/interior/low-poly-cartoon-house-interiors-167425	Nov 10, 2021
School environment	https://assetstore.unity.com/packages/3d/environments/school-assets-146253	May 26, 2021

Character's reference	https://assetstore.unity.com/packages/3d/characters/humanoids/humans/adiar-lowpoly-character-125079	Jan 8, 2020
Character's reference	https://assetstore.unity.com/packages/3d/characters/distant-lands-free-characters-178123	Oct 4, 2021
Multi-language support feature	https://assetstore.unity.com/packages/tools/localization/lean-localization-28504	Mar 4, 2022

APPENDIX II: The Coding Script.

The main camera script:

```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;

public class MouseLook : MonoBehaviour
{

    public float mouseSensitivity = 100f;

    public Transform playerBody;

    float xRotation = 0f;

    // Start is called before the first frame update
    void Start()
    {
        Cursor.lockState = CursorLockMode.Locked;
    }
}
```

```

// Update is called once per frame
void Update()
{
    float mouseX = Input.GetAxis("Mouse X") * mouseSensitivity * Time.deltaTime;
    float mouseY = Input.GetAxis("Mouse Y") * mouseSensitivity * Time.deltaTime;

    xRotation -= mouseY;
    xRotation = Mathf.Clamp(xRotation, -90f, 90f);

    transform.localRotation = Quaternion.Euler(xRotation, 0f, 0f);
    playerBody.Rotate(Vector3.up *mouseX);

}
}

```

The movement of the characters:

```

using System.Collections;
using System.Collections.Generic;
using UnityEngine;

public class PlayerMovement : MonoBehaviour
{
    public CharacterController controller;

    public float speed = 12f;

    // Update is called once per frame
    void Update()
    {

```

```
float x = Input.GetAxis("Horizontal");
float z = Input.GetAxis("Vertical");

Vector3 move = transform.right * x + transform.forward * z;

controller.Move(move * speed * Time.deltaTime);

}
}
```

Switching Scenes:

```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;
using UnityEngine.SceneManagement;

public class LevelLoader : MonoBehaviour
{
    public Animator transition;

    public float transitionTime = 1f;

    // Update is called once per frame
    void Update()
    {
        if(Input.GetMouseButtonDown(0))
        {
            LoadNextLevel();
        }
    }
}
```

```
public void LoadNextLevel()
{
    StartCoroutine(LoadLevel(SceneManager.GetActiveScene().buildIndex + 1));
}

IEnumerator LoadLevel(int LevelIndex)
{
    transition.SetTrigger("Start");

    yield return new WaitForSeconds(transitionTime);

    SceneManager.LoadScene(LevelIndex);
}
}
```