Developing of Video Game for Coping with Anxiety

Prepared by: Zaporozhchenko Anastasiia

Date: 21.11.2023

Email: nastyazaporozhchenko@gmail.com

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1. <u>Abstract</u>

This project was created due to the rapidly increasing popularity of video games and the increasing societal attention to mental health issues. The purpose of the project was to help people cope with anxiety giving the feeling of helpful escapism with video games. Another aim was to spread awareness of those issues and offer players a sense of shared empathy and collective commiseration.

The development process involved several stages, including concept development, game design, programming, and testing. The game was implemented with the use of the Unity game engine and C#. MySQL was chosen as a relational database to store game data and PHP was used to get information from the database. The player experience is supposed to vary depending on a specific level of the game. Particular attention was paid to the color palette and the background music to enhance embedded emotional response.

The project demonstrates the potential of video games as a form of unforced learning and provides a foundation for further research and development. The insights gained from this project can be applied to future game development endeavors.

This report aims to provide a detailed look at the resulting application and some analysis of the research conducted which influenced the design decisions made.

2. <u>Introduction</u>

2.1 Background

One of the project's purposes was to create a project based on the Unity engine to solidify knowledge of programming and game development. Another goal was to implement existing ideas of developing a safe, calming, and empathy-strengthening game to remind players of the importance of dealing with mental issues.

It's important to note that the appeal of such games can be linked to the tendency of individuals to use gaming as a form of escape from real-world problems. People play games to distract from focusing on coping with real-world problems choosing to flee into another context [4]. Although the research hasn't shown the dependency between personality traits and gaming behavior, it was found that there's an age dependency. The number of older players is higher due to the greater level of stress that comes from the number of responsibilities [5].

Indeed, while video games can provide a form of escapism and help individuals cope with stress and anxiety, it's important to maintain a balance. Studies have indicated that using video games for escapist reasons can sometimes lead to a strong belief in the realism of the digital world, potentially resulting in a decline of interest in real-world issues and a sense of detachment from reality [6].

This is why the development of games like the one introduced in this project is crucial. Such games not only provide an engaging and immersive experience, but also aim to raise awareness about important issues. They strike a balance between providing an escape and promoting understanding and empathy. This approach can help ensure that players remain connected to the real world while benefiting from the therapeutic aspects of gaming. It's a delicate balance, but one that this project strives to achieve.

2.2 Functional Requirements

Following are the requirements which must be performed by the proposed system:

- User can move the primary character during most part of levels.
- User can restart the game.
- User can restart the level.
- User can continue playing game from the level he stopped at when exited.

- User can pause the game when it is running.
- User can resume the game if it was paused.
- User can customize settings such as resolution, volume, full screen mode, graphics.

2.3 Non-functional Requirements

Following are the requirements which are related to the performance of the system:

- System must be easy to use.
- User interface must be convenient and intuitive.
- Language should be English.
- System must be easy to maintain and update over time, have a clear and organized code structure.
- System must be reliable and available for use at any time, with minimal downtime for maintenance or updates.
- System must be able to handle a large number of simultaneous users and requests.
- System must have a fast response time.

2.4 Source Code

The source code for this project can be found at:

https://github.com/mynameiszp/Novyi-Svit-Unity

3. <u>Outline Solution</u>

3.1 Synopsis

The player dreams of finding a place called the New World. To do that, he has to leave his tribe and overcome many obstacles on the way. Will he be able to do that?

3.2 Game Description

This game includes different types of levels: platformer, hidden objects, and storytelling. The levels are divided into eight blocks. Each of the blocks contains at least one storytelling level and one platformer level. During storytelling levels, the story appears after the player comes to the secondary character. These levels are the first in each block. In hidden objects levels, the player has to find all the objects to move to the next level. The number of hidden objects differs in scenes. The platformer levels are the last in each block. They represent a transition from one mental state to another.

3.3 Use-case
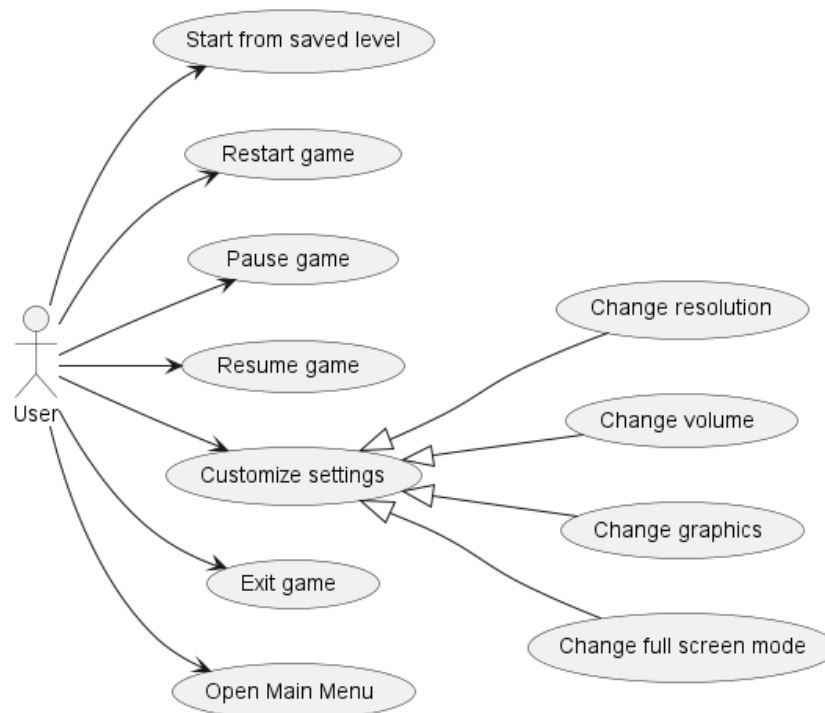
Use-case diagram for the game is shown in Figure 3.1

Figure 3.1: Use-case diagram

4. <u>System Design (List of Classes and their Responsibilities)</u>

Number	Class Name	Responsibility
1	FinalScene.cs	Restarts the game after player pressed button in the final scene.
2	GameSession.cs	Creates DontDestroyOnLoad object which contains data from the database and processes player death.
3	HiddenObjectData.cs	Serializable object for storing data about hidden objects.
4	HiddenObjectsLevel.cs	Is responsible for game algorithm in hidden object levels.
5	LevelStoryData.cs	Gets dialogs data relatable to the current scene from GameSession object.
6	MainMenu.cs	Is responsible for functions of Main Menu.
7	NextLevelController.cs	Transits from platformer level to next level.
8	NextLevelEntry.cs	Loads next level for entry scene.
9	NextLevelHiddenObjs.cs	Transits from hidden objects level to next level.
10	NextLevelNoExit.cs	Loads next level for scenes without icon of exit.
11	Parallax.cs	Is responsible for background moving.
12	PauseMenu.cs	Is responsible for functions of Pause Menu.
13	PlayerMovement.cs	Defines the way the player moves in platformers.
14	PlayerStoryMovements.cs	Defines the way the player moves in storytelling levels.
15	SaveLevelController.cs	Is responsible for saving level in platformer and storytelling levels.
16	SaveLevelHiddenObjs.cs	Is responsible for saving level in hidden objects levels.
17	SettingsMenu.cs	Is responsible for functions of Settings Menu.
18	Warning.cs	Shows warning if GameSession object failed to collect data from database.

Table 4.1: List of classes and their responsibilities

5. <u>Level Design</u>

5.1 Color Palette

The design and development of such games is a complex process that requires careful consideration of various factors. The use of color is not just an aesthetic choice, but a tool to influence player emotions and enhance the gaming experience. Since the color palette plays a crucial role in achieving the desired impact, it was given significant emphasis. According to Kubler-Ross Change Curve [1], there are seven stages of personal change. They are shown in Figure 5.1.
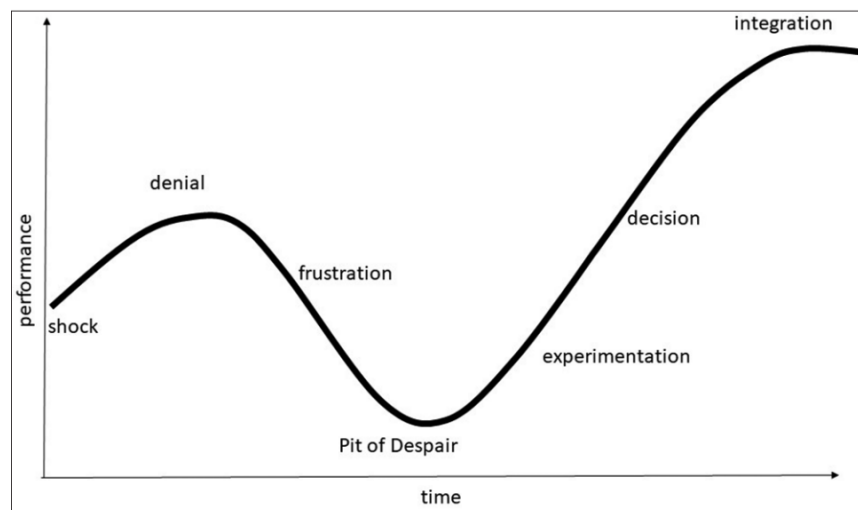

Figure 5.1: The typical stages of personal change [1]

The game structure is built upon the seven stages outlined above. All the levels within the game are grouped into eight blocks: excitement, shock, denial, frustration, depression, experiment, decision, and integration. The player meets a new character during each block. Both the primary and secondary characters exhibit emotions corresponding to the block they are in. Those feelings are conveyed through dialog. While the secondary character shows symptoms of his state of mind, the primary character attempts to assist him in dealing with his mental issue.

The game's color palette was derived from a research study [2] that published the circumplex model for color scripting in video games. The model is shown in Figure 5.2.
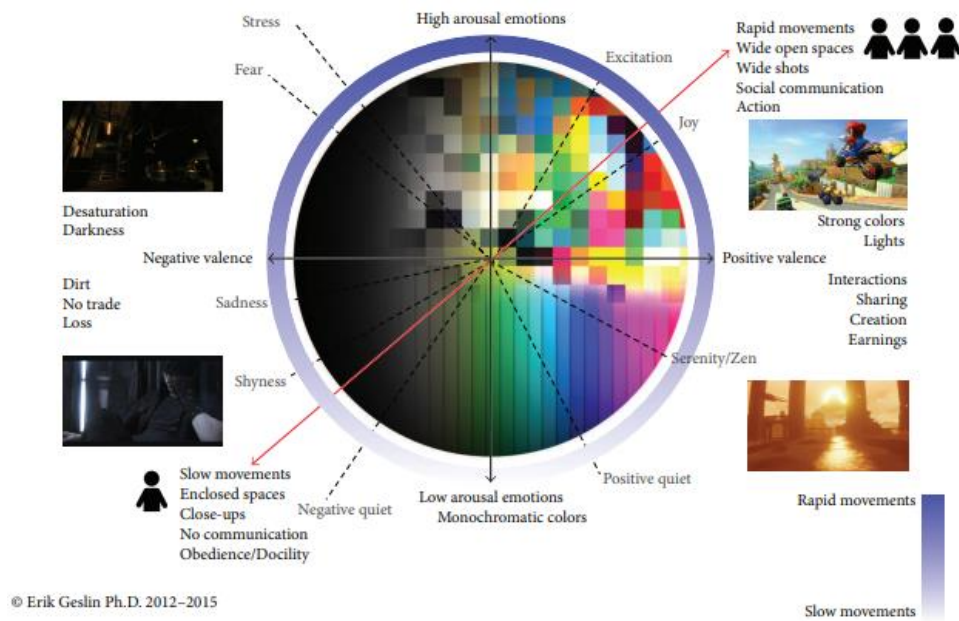
Figure 5.2: A tentative circumplex model for color scripting in video game [2]

This model was used to enhance player experience due to the level the player is currently on. Another study [3] suggests the correlation between colors and emotions in video games. The model is depicted in Figure 5.3.
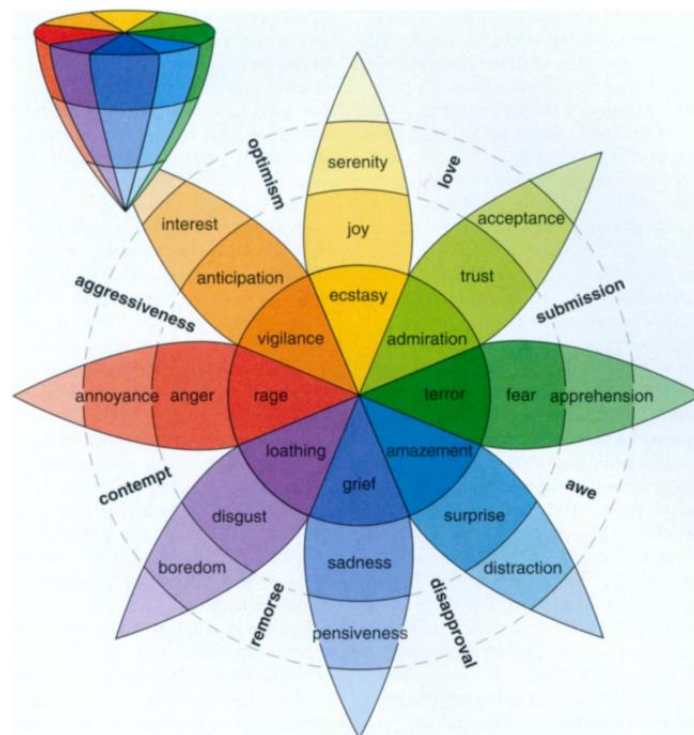

Figure 5.3: Three-dimensional circumplex model describes the relations among emotion concepts, which are analogous to the colors on a color wheel. [3]

Based on the research above, the preliminary scheme for color design was developed. The scheme is presented in Table 5.4.

Emotion	Colors
Excitement	Yellow, Orange, Green
Shock	White, Red
Denial	Black, Red
Frustration	Grey, Brown
Depression	Dark blue, Black, Grey, Brown
Experiment	Red, Yellow, Green, Blue, Purple
Decision	Purple, Yellow, Green, Blue, Red
Integration	Light green, Blue, Pink, White

Table 5.4: Preliminary scheme for color design

5.2 Music

In addition to color design, musical accompaniment was incorporated as another method to immerse the player further into the story. The music samples were added to each level and the main menu. These samples aid in conveying the emotions of the characters and the overall mood of specific scenes.

5.3 Scenes

The majority of scenes follow the general pattern. The scenes below are either unique or representing the pattern.

Figure 5.5: MainMenu Scene

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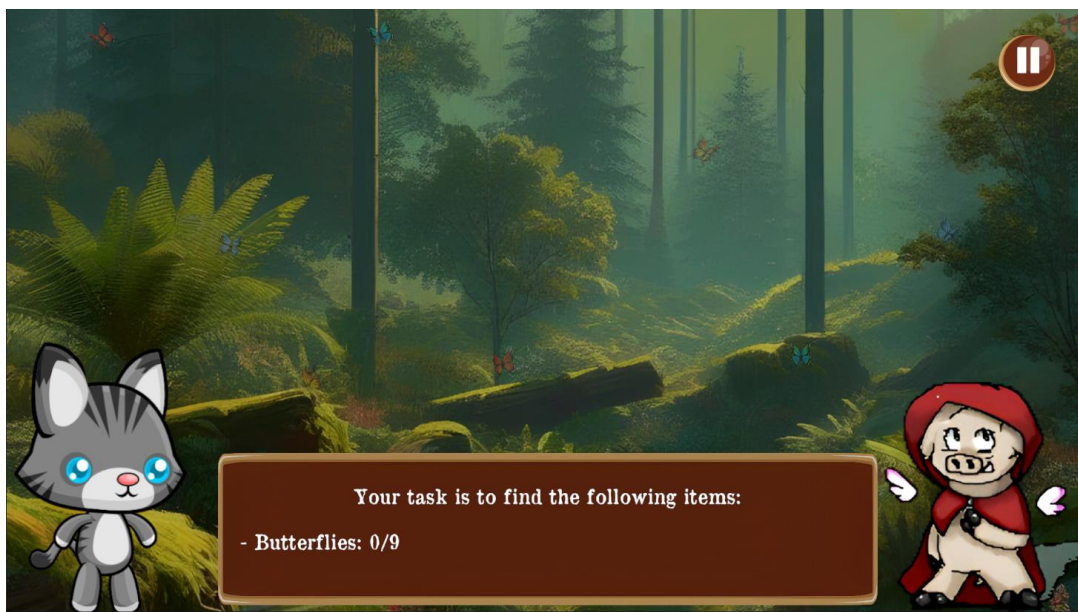Figure 5.6: ForestStory1 Scene (storytelling level)

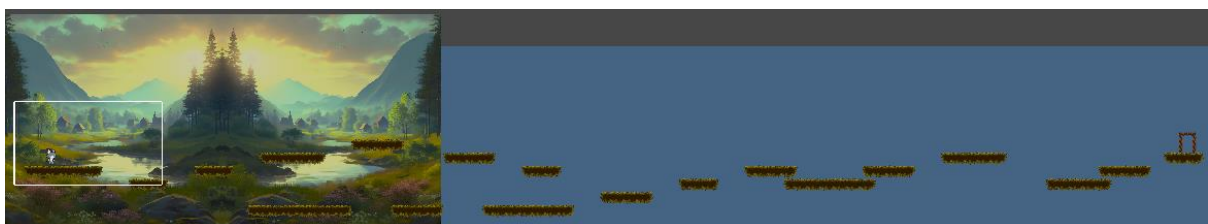Figure 5.7: ForestHiddenObjs Scene(hidden objects level)

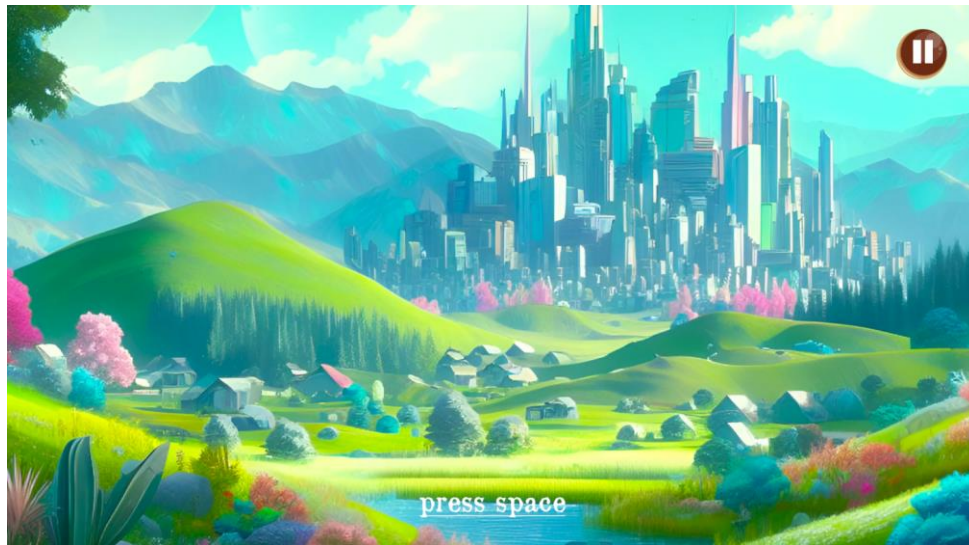Figure 5.8: ForestPlatformer Scene(platformer level)
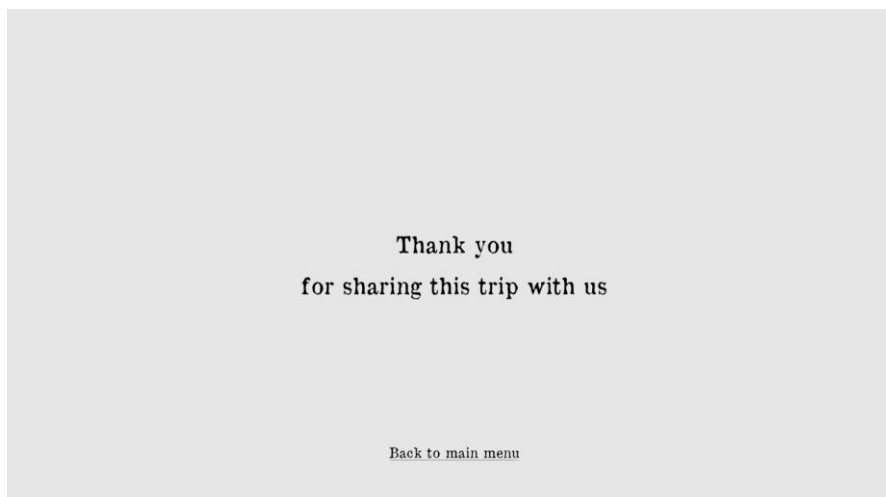
Figure 5.9: NewWorldEntry Scene
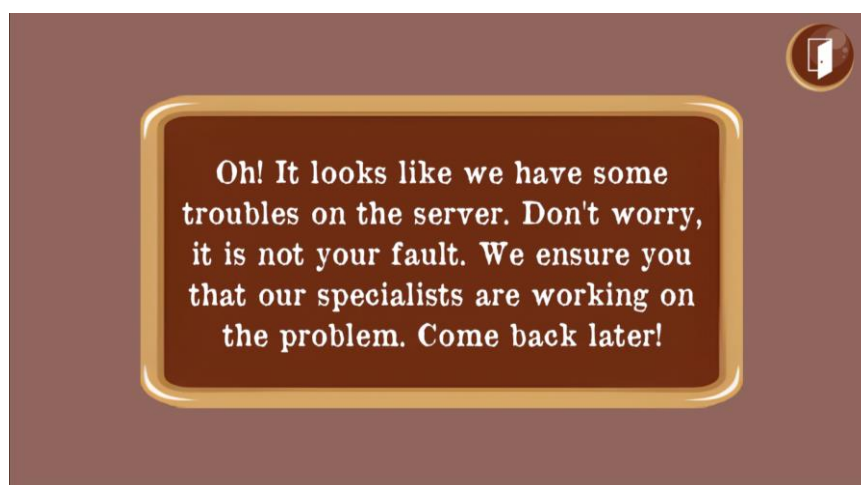

Figure 5.10: FinalScene

Figure 5.11: ServerError Scene

6. <u>Game Design</u>

6.1 Game Rules

The game starts with the player entering the main menu where the player can select one of the options: play, restart, open settings, or exit the game. The goal of the game is to complete all levels to finish. In the storytelling levels, the player can move only horizontally. He approaches to secondary characters and enters the story mode. In story mode player can't move, only scroll through the dialog. After the dialog is played, the player exits story mode. The doors which are the gateway to the next level appear. The player must walk into them to complete the current level. In hidden objects levels, the player can't move. His task is to find all the objects from the least to complete the current level. When all the objects are found, the doors appear. In platformer levels, the player must jump from one platform to another to avoid falling. The player can't control his speed and movement directions. The player must reach the doors to complete the level. The doors are located on the last platform of the level. If the player falls out of platforms, the level automatically restarts.

6.2 Game Play

The Figure 6.1 illustrates the inputs to control the player. For PC we are using keyboard keys to move the player.

Figure 6.1: PC Keyboard Inputs [7]

7. <u>Managing Data</u>

7.1 Server

MySQL database was chosen as the storage for dialogs data. The table structure is shown in Table 7.1. Script written with PHP was used to collect the data from the database.

Name	Type	Is null	Additional
ID	Int(4)	No	AUTO_INCREMENT
Scene_name	Varchar(40)	No	
Speaker_name	Varchar(30)	No	
Text	Varchar(220)	No	
Avatar_link	Text	No	

Table 7.1: Structure of table "lines" in database

7.2 Handling Server Disconnection

If there's no connection to servers that provide database connection and execution of PHP script, the game will be stopped. Since the connection has to be established in the script which executes in the MainMenu scene, the exception will be thrown during this scene. In this case, the ServerError scene will be shown to handle this situation and not let the player play the game. In this scene, the explanation is shown to the player and he can exit the game.

8. <u>User Interface</u>

In the MainMenu scene, the player can open the settings menu and change the values for defined options.

Figure 8.1: Settings Menu in MainMenu Scene

In each scene, there is a pause button in the upper right corner. If it is pressed, the Pause Menu appears and the game stops. The player can change the sound, resume the game, restart the level, or head to the main menu.
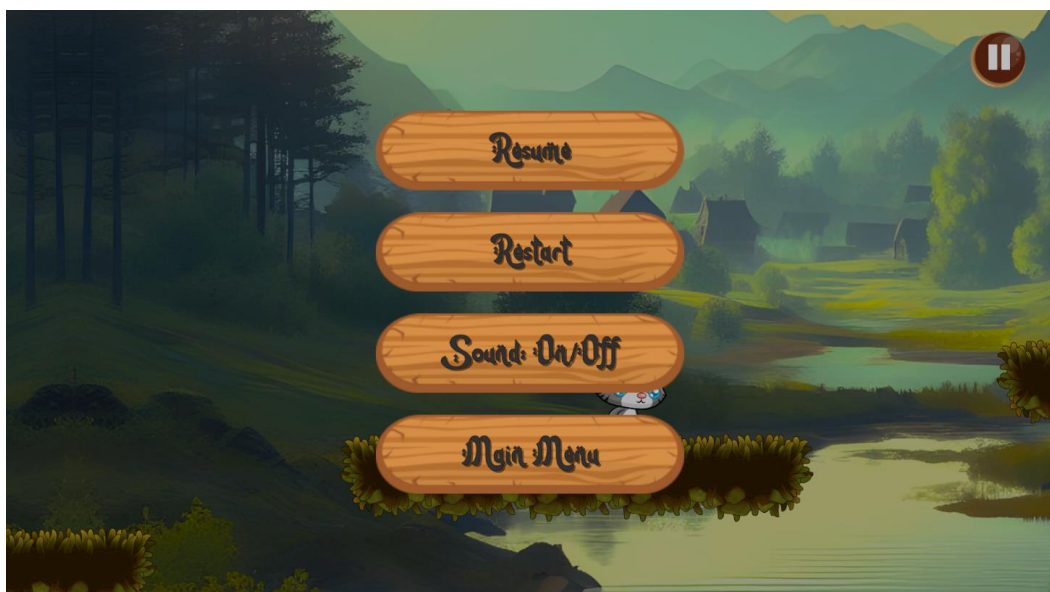

Figure 8.2: Pause Menu

DesertStory2 scene belongs to the block of scenes that represent depression. At the end of this scene, the message about the importance of dealing with depression appears on the screen. It is shown in Figure 8.3.
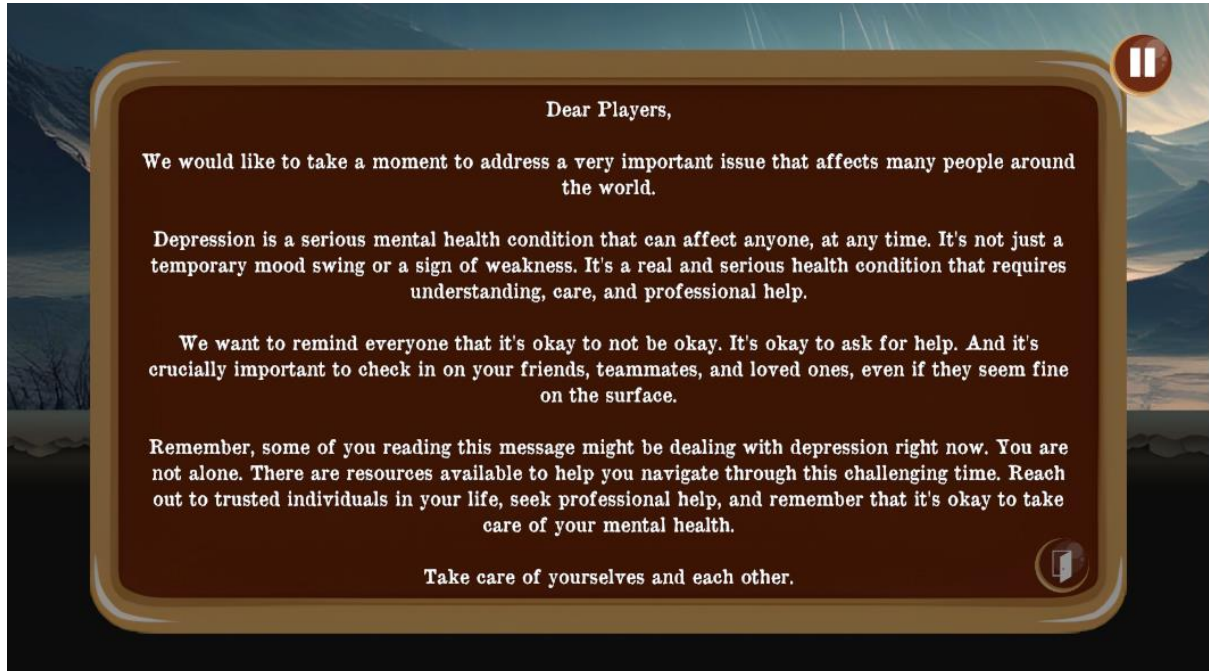

Figure 8.3: Message in DesertStory2 scene

9. **Future Development**

The extension for the project might include:

- Multi-user version for the conversations between players.
- Support of AI in terms of generating responses to user's messages. This includes replacement of part of scripted dialogs with characters or adding an option to continue the dialog.
- Ability to choose the appearance of the character and its name.
- Contacts of the national hotlines aimed to provide mental heath help. Contact numbers might be shown depending on user's country.
- System of rewards and encouragement.
- Development of IOS and Android versions.

As for the changes, there might be modifications to the scene algorithm of showing stories:

- Current algorithm: player walks to the character and when the collider is triggered the player enters story mode. Player exits story mode automatically when the story ends.
- Possible algorithm: the scene starts with the story. Player uses space bar either to start the story or to skip it. When story is finished the player is asked either to watch the story again or step to next level.

10. <u>Conclusion</u>

The project showed the potential of video games as a form of unforced learning. The attention to detail in the game design, particularly the color palette and background music, significantly enhanced the emotional response elicited by the game. The insights gained from this project can serve as a valuable foundation for future research and growth in game development, particularly games aimed at addressing societal issues.

Overall, the project underscores the power of video games not only as a form of entertainment but also as a medium for conveying important messages and fostering a sense of community among players. Hopefully, this project will inspire further exploration into the intersection of video games and mental health.

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