Maze Dash: Accessibility and Building Community

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Abstract

This paper introduces Maze Dash, a game designed with the goal of increasing accessibility amongst the controls. Whilst making the game, we aimed to center disability, allowing the game to be accessible to users with a diverse range of abilities. The inspiration behind this project were the students at the Park School who had physical and/or cognitive abilities but engaged in the same activities. While working with the students, we noticed that the main focus of the program was not only to help the students learn a new skill but also to focus on ensuring that the students were having fun. Our goal was to promote collaboration amongst students with a variety of ages and abilities. As a result, we were inspired to recreate the classic maze game but with different accessibility features already built-in.

Author Keywords

Ability-based design, community building, disabilities in classrooms, extensions

Introduction

We decided to volunteer at Park School through Northwestern's Special Olympics club. Special Olympics is a club at Northwestern University that partners with the larger Evanston Special Olympics organization. According to the club's mission statement, they aim to "integrate individuals with developmental disabilities in [the] community through athletic competition, inclusive programming and events to raise awareness" [1]. They offered a variety of activities available from sports such as powerlifting and swimming to more skill based classes such as cooking and tutoring. We chose to volunteer at the Sensory Cooking site. The class focused on cooking 1-2 simple dishes as a group.

The class had students ranging from middle schoolers to high school graduates. Although we were using the space at Park School, the individuals at this activity did not necessarily have to study at the school to sign up for this activity. This made us realize how different each person's intentions were at the class. It was great to see how the group leader managed the dynamic of the class as some were there to learn a new skill while others were just there to have fun and eat. Additionally, there was a diverse range of abilities within this classroom. Some students had cognitive disabilities while others had physical disabilities or both.

Our experience with NU Special Olympics inspired us to make Maze Dash. Similar to the Sensory Cooking experience, Maze Dash aims to create a medium which allows users of diverse abilities and backgrounds to engage in the same activity, have fun and feel a sense of community from it. Our initial thoughts from Park School continued to grow from the ideas presented in "Ability-Based Design". The authors researched and emphasized the importance of designing around the specific abilities of the user rather than relying on the user to provide or create their own adapter. Many users do not have the means to make their own adapter and the

designer is only preventing the reach of their product by not centering accessibility [2]. We hope this addresses the institutional barrier that puts the responsibility of adaptation solely on the user and, instead, shows the possibilities associated with how centering ability not only increases your audience but also increases the overall fun of the game.

Furthermore, Maze Dash addresses the social aspect of common experiences mentioned in "Non-Visual Soldering". The panelists explained how a big part of feeling a sense of community is built upon engaging in common experiences. These activities allow people to find commonalities with others and form a relationship [3]. Currently, there are limited spaces for people with disabilities to do this. We hope that Maze Dash can be a part of lessening this social barrier, so that students in environments like Park School and beyond are able to play and share our game with others.

Positionality Statement

As two undergraduate students at Northwestern University, we understand that we have a responsibility as allies to put ourselves in a listening role when working with students with disabilities as we want to better understand their point of view and upbringing. We realize that we can never fully be able to understand their experience but we should still attempt to put their feedback at the forefront of our research and project testing. We also acknowledge that we do not want to overstep where our help is not needed so we go forward with the intention of ensuring that anything we are making is something that our audience is comfortable with.

Project Overview

We created a game with three different playing options: keyboard, motion censoring, and audio cues. When the player starts the game, the three options are presented on the welcome screen and the player selects one of the three modes before moving on to the game (Figure 1). The basis of the game is a maze that the player must navigate through in the time allotted.

Figure 1: Opening screen with playing options (keyboard, motion, audio)

When the player selects the keyboard option, they control the sprite's movements using the up, down, right, left arrows on their keyboard. They also have the option to go to a black out screen if they experience sensory overload. They do this by pressing the '1' key. Once the key is pressed the entire screen turns black. They can then take as much time as they need before continuing to play the game. Once ready to continue, the player then can press '2' to restart the maze and continue without any penalty. If the player is able to navigate through the maze before the timer finishes, they are brought to a "You Won!" page; otherwise, they are brought to a "You ran out of time, try again" page where they can then restart the game by pressing the Spacebar. When they are back to the welcome page, they can choose any of the three controls again.

The second control option is playing using motion censoring. When the game begins, the webcam turns on and our program is able to track the location of the player's hand and move the sprite in the appropriate direction. We wanted this control option to allow players with limited dexterity to be able to play the game without having to press any keys. We adjusted the timer appropriately to ensure that the player has enough time to move through the maze using the hand censor.

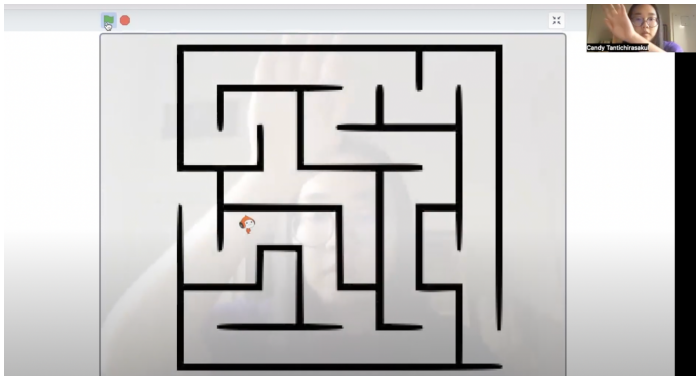

Figure 2: Demoing the Motion Sensor Control

The last playing option is similar to the keyboard controls, but there is an added feature of audio cues. When the game starts, it will read out exactly what is happening to the sprite during the game. For example, when the sprite hits one of the maze's walls, the game will give an audio cue, "You hit a wall." Through the audio cues, the player can better understand the environment of the game and can navigate through the maze with more information. This playing option would be similar to the VoiceOver function that is implemented in many computers.

Design Process

We began our design process with researching which platform would be the best to implement our game on. We decided on using Scratch to code the game because of its low floor high ceiling interface [4]. We observed how the platform used simple block coding that can be learned even by those with little to no experience with coding (see Figure 3).

This easy interface leaves open the possibility for users to continue editing the game beyond the scope of this project. Although we have begun adapting to some of the user's needs, every user is not the same and that a user's abilities may change with time [5]. We acknowledge that it is impossible to make one iteration of the game that will suit everyone's needs. We have tried to come up with built-in extensions that suit a range of abilities but Scratch allows Maze Dash to continually be adaptable. Scratch also has a variety of extensions that will help us expand from just the screen and the keyboard into other interfaces such as motion sensors and sounds.

Once settled on Scratch, we began implementing the game. One person began coding the basics of the game (maze, keyboard, start/end screen) while the other began working on how to incorporate extensions, such as the motion sensor and sound aspect of the game.

In the 3rd week of our design process, we began testing our product in order to incorporate the feedback in newer iterations of the game. As this was the end of the quarter, the Sensory Cooking site meetings had ended for the academic year so we were not able to find time to test the product with our community partner. However, we still wanted some feedback on our project so we decided to test it with our peers at Northwestern. The main takeaway from the testing was how we could add competition but keep it on a level playing field. We originally had a timer, but we were unsure about how long to set it as different people would require different amounts of time to complete the game. We decided to increase the playing time so that all players would be able to complete the maze in the time provided.

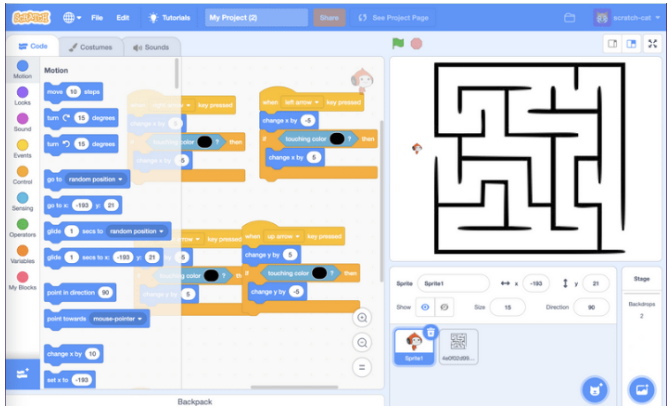

Figure 3: Scratch Interface

Conclusion and Future Work

As we improve this game and eventually reach a point where we can release it for students to play, we aspire that the game will function as an online community where students can play together and help each other through. Furthermore, we can include a leaderboard of the best times to increase the competition aspect of a game.

Another way to promote the community building aspect is to create a way where strangers from similar upbringings can join a community and compete amongst each other. This way they can connect with each other and bond over their interests. There can also be a multiplayer choice where students can compete to finish the race on the same map, with one player using the up, down, left, right arrows and the other using the WASD keys to control their sprites through the game.

We believe that a lot of testing still needs to be done with our intended audience. The first step would be to bring the game to the students of the Park School and get feedback about what they think needs improvement. From there, we can make adjustments according to the user testing and then increase the group of testers. Through our user testing, we want to ensure that our testing group represents people of diverse backgrounds similar to that of the VR Testing article [6], from different abilities to ages to genders. In addition, we plan to consider whether the player can play the game alone or with a person to assist them, according to their preference.

In terms of the future of this project, we hope to optimize our game on a different platform. We had challenges when integrating the voice activation portion of the game due to limited functions in Scratch's extensions. The platform also struggled to run a program as big as our code which caused a lot of lagging. Thus, we decided to split the program into three different files. Our future iterations of Maze Dash would be one cohesive file and have a voice activated control option. Users will also have the option to pick between easy, medium, and hard so that the player can choose the timer length or the level of maze complexity when playing the game.

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