

GIT Physical: Final Team Report

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Introduction

As we contemplated the ways in which education has changed due to the COVID-19 pandemic, our team coalesced around the changes that have occurred in physical education, particularly for children. Before the pandemic, the physical health community was already concerned about rising child obesity and excessive sedentary screen time. Now, the pandemic has made it even more difficult for children to exercise. Virtual school has left many children without a dedicated time and area, such as the school gym during P.E. class, to exercise each day. Restrictions on public gatherings and outdoor spaces like playgrounds have also limited the ways children can be active. Moreover, with parents juggling virtual school in addition to their own work, adult supervision and facilitation of activities is difficult as well.

In this context, we sought to create an online platform to enable children to stay physically and mentally healthy. The app will create an immersive, virtual community, modeled after a small village, in which AIs and potentially real-life users of the app are represented visually as customizable human avatars. Upon opening the app, the user will enter their age, height, and weight and customize their own avatar. Within the village, they can discover and participate in various activities that other villagers are doing. While completing the activities, the phone's front-facing camera activates in order to record the child's movements, and the avatar onscreen reflects the child's motions. Depending on the child's performance and engagement in the activity, varying amounts of gold are awarded. The gold can then be used to purchase new clothes for the avatar or new amenities for the village.

Through this platform, we hope to achieve the following learning objectives:

1. Students will be able to describe the importance of physical activity in creating healthy practices.
2. Students will be able to accurately move their body according to instruction.
3. Students will be able to demonstrate spatial awareness.
4. Students will be able to regulate their emotional state more easily.

Our primary project goal has been maintained throughout each iteration: create a gamified virtual platform to engage children in their fitness. However, while we originally wanted to focus in equal parts on physical and mental health, we decided to narrow our scope to focus more exclusively on physical fitness. We still include some activities focused on mindfulness and emotional understanding, but the majority of the exercises in the app are physical.

Background

Fitness Village is a gamified physical fitness app with virtual rewards for good performance. As such, we have enacted a behaviorist view of learning. Behaviorism is the idea that students learn through “forming connections between stimuli and responses”; it follows that rewards could be a stimulus to encourage the correct response (Bransford et al., 1999, p. 6). Fitness Village awards gold proportionate to the child's performance in the activity, and the gold can then be used to buy customizations for their avatar or the village. This type of feedback is intended to help the child understand how to improve their movements and encourage them to continue working toward their goal (Lyons, 2015).

We also make a few assumptions based on the constructivist theory of learning. We recognize that children are not blank slates, and in fact, we rely on this. Our app does not coach students through proper form and precise techniques. Rather, Fitness Village builds on the existing base of knowledge that students have about physical fitness and encourages them to continue their learning in the fun, interactive space. In this way, we rely on Piaget's fundamental proposition that humans assimilate and accommodate new information into their existing understanding (Piaget, 1954).

Metacognition can be defined as the understanding and analysis of one's own thought processes and learning. In gamified environments, reflection upon what has been learned is important in recognizing the real-life applications of the learning and why to continue the behavior after the game ends (Nicholson, 2015). Fitness Village supports this reflection by placing the user in an environment similar to reality. The design of the village and incorporation of activities within village life help the user understand how physical fitness skills can be useful in real-life situations. It is possible that some situations represented on the app remind the users of something that has happened in their own life. These connections between the virtual environment and reality will encourage the user to reflect on what they have learned.

Fitness Village provides the user with plentiful feedback. Feedback is defined as any "informative or evaluative" description of the user's behavior, and it has been shown to increase user self-efficacy, motivation, and learning (Lyons, 2015, p. 12). While Fitness Village does provide feedback during exercises—such as corrections for the user or tips on when to complete the movement—the primary mode of feedback in the app is through rewards. Including rewards to a proper extent is a balancing act. Too many rewards decrease intrinsic motivation, whereas too few may make the game unappealing or unengaging (Lyons, 2015). Fitness Village strikes that balance by providing gold upon successful completion of activities, which can be parlayed into avatar and village customizations, while maintaining the focus on the village activities and characters rather than the aesthetics. In this way, the gold can be used to accomplish secondary goals but does not take over as the primary motivation for playing the games.

Methods

We tested our prototype with 12 elementary school children. Most of these participants were family members or connections through family members. The rest were children known from babysitting. All sessions were completed between April 18 and April 26, 2021.

The sessions were completed entirely virtually on a Zoom call using a Wizard of Oz style of testing, usually with a parent supervising in the background. Due to the limitations of our prototype and having to conduct the testing over Zoom, this approach allowed us to control interactions behind the scenes while still presenting a fluid user experience. The GIT Physical member screenshared the prototype and guided the participant through the avatar creation, Log Jump activity, and store. We then asked a few short, simple questions to gauge the user's overall impressions and likelihood of using the product. The questions were as follows:

1. [on screen with menu bar] What do you think each of the icons along the bottom means?
2. How do you feel about being able to buy new accessories for your avatar?
3. How do you feel about being able to navigate freely around the village map?
4. How do you feel about playing the Log Jump game?
5. How do you feel about moving around while you play a virtual game?
6. Did you have fun with this app?
7. Would you want to play a game like this in reality?
8. What other games would you like to see in this game?

Findings

User response was overwhelmingly positive. Multiple participants asked if they could Google the app or when it would be available on the app store. Most participants were disappointed that our prototype did not have the game portion fully fleshed out, indicating excitement to play. Our graphics were intuitive for the participants, and the demonstration flowed logically for them. While there was no outright negative response, some of the younger participants lacked the same enthusiasm and did not seem fully engaged. This is understandable, given that the participants straddled two different stages of development (Piaget, 1954).

Because our game was not functional (due to the technical and time requirements of this project), we were limited in how much we could assess learning within the actual in-app activities. However, we found that even in interacting with the prototype, participants learned to embrace creativity in physical spaces. Our prototype encouraged this creative thinking by demonstrating one outside-the-box example of exercises movements incorporated into real life. Through our interview and follow-up questions, we primed users to think more creatively and critically about the types of interactions and activities they can have in their homes. This prompting even led to suggestions for different

activities to include in the app. A popular suggestion was to include sports-related activities such as basketball, football, and soccer. Other suggestions included hopscotch and gymnastics.

Discussion

Fitness Village supports current teaching, as it is an at-home supplement to in-school physical education. It is meant to ease the burden on parents and virtual teachers by providing a fun outlet for children to continue exploring their physical fitness since they cannot do so in person during the pandemic. However, it does improve upon basic physical education by immersing users in a fun, interactive environment and presenting exercises in novel ways that may not be seen in a traditional P.E. class. Moreover, with certain expansions, the app could potentially disrupt other popular exergames, such as Wii.

Limitations

Our app is limited to elementary schoolers above second grade, and it is not intended for in-class use. It does not incorporate school learning standards and is meant to supplement physical education given the challenges of online learning that many students have experienced due to COVID-19. Our app is also not intended for students who have not yet taken a physical education class and who have little to no basis of knowledge about physical fitness.

Conclusion

The graphics of the avatar and the idea of navigating a village are the strongest points of our design. The idea of immersion in “another world” was a source of excitement to all of our participants. The biggest challenge we may face is coming up with enough different activities to keep students engaged while exercising. After all, there are only so many different real-life scenarios in which legitimate exercise movements, such as a squat or lunge, might occur. Our other weakness is the actual mechanics of seeing the user’s movements—it is unclear whether a phone’s front-facing camera would be sufficient or if a wearable device may be necessary, which would unfortunately create a barrier to entry and limit our audience.

Our work has great potential for expansion. A different, more mature version could be developed for middle school children. We could also work to integrate the learning into the school standards so that the platform can be used by teachers in schools rather than as a supplement for parents. We could also make it more interactive by allowing a user to interact live with their friends’ avatars in the village and completing activities with them.

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