

A Tale of Two Schools: Terrain and Resources in Virtual Games and Physical Communities

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Abstract: Our research focuses on the use of wearable activity monitors to motivate behavior change and increase adolescents' health and physical fitness. Youth participants wear Fitbits that sync with a video game, thus connecting their physical and virtual experiences. This poster presents two case studies: an urban middle school and a suburban junior high school. In a gamification of our research methods, we describe the "terrain" (a community's affordances for physical activity) and "resources" (a community's access to technology and funding) of our two case studies alongside the terrain and resources in the online game.

Introduction

Our research team studies middle-school youth in Northern California who wear Fitbit activity monitors and play a video game we created. The game draws data from the Fitbits, providing a tangible connection between physical and virtual experiences. Our design-based research approach focuses our thinking about technology and students' beliefs and behaviors within an ecological framework that considers aspects of the community wherein activity takes place. Ecological models are found in health behavior research (Sallis, Owen & Fisher, 2008), sociological examinations of health relative to the built environment (Booth et al, 2005; Burdette & Whitaker, 2006), and educational technology research (Zhao & Frank, 2003). We examine differences in the use of Fitbits and games between income communities.

As described in this poster, the communities' similarities and contrasts include "terrain" (a community's affordances for physical activity) and "resources" (material and financial assets, as well as access to technology), which we present alongside a description of the virtual terrain and resources in the video game. By using game features to shed light on community features, we gamify our research methods.

Terrain in the Game

In the narrative of *Terra*, players are recently landed space explorers setting up individual domed bases on a desolate planet. Their goal, completely terraforming the planet, must be completed within a limited number of weeks so more people can come settle the new world. It is essentially a tile-based game: users explore "foggy" tiles one at a time and then populate those tiles with terrain features. As the game progresses, the landscape of the world players create becomes an aggregate visual representation of their physical activity during the game campaign, with each player's landscape reflecting not only strategic in-game decisions but also their daily fitness.

Terrain in the Community

One of our case studies is a middle school in an urban area of a major city; the school is located on a street with busy traffic due to a highway interstate and industrial factory nearby. The students are limited in their ability to walk or bike around their neighborhoods, and from home to school, because of safety concerns. The other case study is a junior high school on the edge of a small town containing a large research university; the school rests off a moderately busy street with several greenbelt and bicycle routes connecting the school and surrounding neighborhoods. Consequently, students often walk or bike from home to school and around their neighborhoods; the major barrier to exercise for these youth is their own busy schedules. Our poster includes images of both communities.

Resources in the Game

Terra players' in-game resources depend on their real-world activity. The students' objective, to terraform the planet, requires resource use for planting crops, mining materials, constructing buildings, and exploring their areas. Each of these actions requires the students to make decisions about how to use their daily allotment of energy points. In addition to a base number of energy points, for every 1000 steps a student took in the real world the previous day, they receive an additional energy point. Thus, real-world activity boosts in-game resource availability.

The players also have access to a dashboard in the game that summarizes their daily steps, calories, and activity types. This dashboard also provides an overview of their game statistics, i.e., tiles explored and available food,

ore, and energy. Finally, there are also a series of leaderboards that allow the students to compare their efforts with their classmates, often resulting in healthy competition. The dashboard connects the game and real life, and facilitates thinking about and quantifying the students' daily activity more concretely.

Resources in the Community

At the middle school in a large urban city, access to technological resources in the classroom was an initial concern. Students had access to laptops and the internet at school; however, we found that these computers had many technical limitations. The power cords in the media cart didn't charge the computers consistently so the research team brought bags of chargers and charged the computers before students arrived. We also found that 85% of participants reported accessing a computer at home, 67% reported internet at home, and 40% reported having smartphones.

While the students in the first case study were participating in an after-school program, the other case study participants were students in a formal curricular class. This school was located in a small, well-resourced town. Students were in a technology classroom with desktop computers and internet access for each student. The computer lab also boasted a CNC machine, 3D printer, and a workshop. With this group, we found that 98% of participants reported accessing a computer at home, 96% reported internet at home, and 85% reported having smartphones. Most students carried around smartphones at school, and several choose to sync their Fitbits using the smartphone app.

In addition to technology resources, the two communities offered different opportunities for physical activity. For example, in the urban middle school, students had few opportunities to participate in after-school sports or teams, while many of the suburban junior high school students were involved in both extracurricular and school-sponsored sports and teams.

Conclusion

Through playing *Terra*, students soon learned that the game terrain they could terraform depended on their in-game resources. While energy points could be obtained through successful game activities, they also largely came from daily activity, which was tracked by the Fitbit. In this way, the terrain and resources of the real world impinged upon a student's game experience. Due to this link between the virtual and extant worlds, community resources shaped the choice of technologies in this project. The game *Terra* was designed to run in a web browser and require minimal Internet speeds, so that students in schools with poor connectivity could still play the game. Currently, the game works on computers, so students with computer access at home can use it, but the game does not work on a smartphone or tablet browser. Our research design was shaped by considering the interaction of terrain and resources in the communities of our participants.

References

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