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# Stepping Outside the Classroom: Fitness Video Games For K-12 Settings

**Elsa Eiriksdottir**

School of Psychology  
Georgia Institute of Technology  
Atlanta, GA 30332 USA  
elsa@gatech.edu

**Yan Xu**

College of Computing  
Georgia Institute of Technology  
Atlanta, GA 30308 USA  
yxu7@gatech.edu

**Dan Kestranek**

College of Computing  
Georgia Institute of Technology  
Atlanta, GA 30308 USA  
dan.kestranek@gatech.edu

**Richard Catrambone**

School of Psychology  
Georgia Institute of Technology  
Atlanta, GA 30332 USA  
rc7@prism.gatech.edu

**Andrew Miller**

College of Computing  
Georgia Institute of Technology  
Atlanta, GA 30308 USA  
andrew.miler@gatech.edu

**Elizabeth Mynatt**

College of Computing  
Georgia Institute of Technology  
Atlanta, GA 30308 USA  
mynatt@gatech.edu

**Erika S. Poole**

College of Computing  
Georgia Institute of Technology  
Atlanta, GA 30308 USA  
erika@gatech.edu

**Abstract**

We discuss the development and ongoing evaluation of The American Horsepower Challenge, a pedometer-based fitness game for middle school students that is being used in over 60 schools across the United States.

**ACM Classification Keywords**

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

**Introduction**

In this paper, we describe our ongoing study of a nationwide deployment of a pedometer-based fitness program for middle school students called *The American Horsepower Challenge (AHPC)*. Developed by Humana Games For Health and sponsored by The Humana Foundation, the philanthropic arm of Humana Inc.<sup>1</sup>, AHPC is a game that turns everyday walking activity into a team sport.

Through a combination of wireless pedometers and a Web-based game, AHPC tracks students' steps and turns them into points in an online school vs. school 'horserace.' Our research team has been following the participants in this competition over two school years by collecting step data, surveying stakeholders in the game, conducting focus groups and individual interviews with students, and conducting interviews with some

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<sup>1</sup> "One of the nation's leading health benefits companies"



Fig. 1. Illustration of a shoe with a pedometer



Fig. 2. A horse before and after customization



Fig. 3. School busses on the racetrack (AHPC version 1)

parents and teachers. We are investigating whether this game changes the participants' attitudes and everyday physical activity levels.

The American Horsepower Challenge addresses two trends: a decrease in youth physical activity levels and an increase in online and computer-based social play. Adolescents and teens have adopted increasingly sedentary lifestyles. As of 2004, 17 percent of adolescents aged 12-19 were overweight, compared to just under 6 percent in 1980. Most disturbingly, studies have shown that overweight adolescents have a 70 percent chance of becoming overweight adults. [1] Additionally, youth are spending increasing amounts of their social leisure time online. As of 2007, 93 percent of American teens reported regularly using the Internet, 64 percent of whom reported actively engaging in social and collaborative activities online. Videogames are similarly universal: as of 2008, 97 percent of American teens reported playing video games, and 76 percent of them play games with others. [2]

AHPC attempts to leverage youth online activity as a way to encourage everyday physical activity. Instead of encouraging physical activity on the individual level, AHPC introduces competition between different schools and collaboration between teammates in the same school, providing other initiatives for the children to have more physical activity.

### Design and Deployment

AHPC takes real-world fitness data and feeds it into a virtual environment: a road race in which schools (each represented by a cartoon school bus) compete for grants from The Humana Foundation that support onsite wellness activities or services. Each participating

student at a given school is represented by a horse avatar that sits inside their school's bus, and the relative position of the school buses on the racetrack correlates with the aggregate step-counts of students in each school.

To input step-count data, each student wears a foot-mounted pedometer that wirelessly syncs with a base station set up in a high-traffic area in their school. Students' step counts are uploaded to AHPC servers each time they pass within range of the base station. Students can log onto the game website to check their steps, see their school's standing against other schools, and purchase outfits or 'skins' for their horse avatars as a function of the number of steps the student has taken. Students can also update their 'status' and view other students' updates in a Twitter-like activity stream.

The competition takes place over a four-week 'heat.' Thus far, there have been three heats: spring 2009, fall 2009, and spring 2010. With a few exceptions, the same students have been enrolled in all three heats. During a heat, students' steps are counted by the system and their results are updated continuously. At the end of the competition, the school that has the most number of steps wins the competition. The program began with 78 schools across the United States selected by The Humana Foundation based on participation in the National School Lunch Program, a federally assisted meal program. Sixty-one schools have continued in AHPC across all three heats of the game.

### Related Work

AHPC incorporates features of two related research agendas within the CHI community: games for health and pedometer-based fitness interventions.

AHPC takes cues from ubiquitous computing systems that track and display fitness activity in order to integrate activity awareness into users' everyday social lives. *Fish'n'Steps*, for example, displays users' physical activity levels as fish in a publicly viewable fishbowl [6], while *Chick Clique* allows small groups of friends to share instantly updated step-count leaderboards. [7]

Games for health motivate players to complete desired actions by making use of video game reward structures. Players are often rewarded for the achievement of a particular in-application goal. For example, in the influential diabetes video game *Packy & Marlon* [3] for the Super Nintendo system, players were rewarded when they managed their character's blood glucose throughout a level. Players reported taking more ownership of their food intake and insulin measurement as a result.

Other health games focus on the desired physical activity itself, what Florian Mueller has termed 'exertion interfaces.' This category includes commercial products such as Nintendo's Wii Sports and Wii Fit series, as well as research prototypes like Mueller's 'Breakout for Two' in which two non-located players compete in a soccer-kicking game via a pair of impact-sensitive video-walls. [4] By encouraging people to have physical exercises together, this kind of exertion interface increases social bonding. In AHPC, we also find emerging social interactions between peers and student-parents, but we focus more on long-term and sustainable behavioral and attitudinal change.

### **Research**

In order to study the effectiveness of AHPC and to understand the ways in which it affects students,

parents, and teachers, we have been following participants since the first heat in the spring of 2009 and plan to complete our observation at the end of this spring's heat. We have invited each student and parent to complete an online survey before the start of each heat and have conducted site visits during which we interviewed students and teachers, both in focus groups and individual interviews.

In our survey design and interview protocols, we have focused on several issues we believe to be central to a successful intervention for this age group. We are looking for any effects the intervention may have had on students' overall activity levels, but we are also interested in any changes in their attitudes toward exercise and physical activities. We are also interested in AHPC as a decentralized team activity and ways in which asynchronous team play have affected students and parents (e.g., taking walks together). Finally, we are interested in the ways in which socio-structural factors associated with the program's school-based intervention have affected its differing success in varied school environments. Through these activities, we have begun to collect a series of preliminary impressions under the broad themes of *family communication*, *social media platforms for health*, and *integration into school environment*.

#### *Family Communication*

Our preliminary results suggest that like similar studies of 'games for health', there are second-order social effects on intra-family communication. [3] In our visits to schools across the country, children have spoken about AHPC, despite being a school-based program, being a way to connect to busy, working parents who otherwise are too exhausted to provide the attention

the children desire. The program provides a legitimate reason for children to talk with their parents a bit more than they might otherwise, and AHPC may serve as a springboard for health or fitness discussions between parents and children.

#### *Social Media Platforms for Health*

The student participants we have interviewed, who are primarily in sixth and seventh grade, self-report as avid users of social network sites, especially Facebook, and they have expressed a desire to integrate their AHPC data into other social streams. As videogames become more social, and as social media become more integrated into children's everyday lives, integration with social media platforms will be key to the future success of programs like AHPC. However, one should expect that children will access these resources outside of the school itself, as the schools we visited had filtering software that in some cases prevented access to popular social media sites.

#### *Integration into School Environment*

When deploying a fitness gaming program within a school, it is important to understand the characteristics of the school itself. For example, our preliminary results suggest school size impacts how students view AHPC; some schools are small enough that nearly every student is given the opportunity to be on a sports team. Because one of the advantages of AHPC is that it extends some benefits of 'being on a team' to its participants, its effectiveness in small schools (where it is much easier to 'make the cut' at sports) may be reduced, at least as currently designed, relative to larger schools.

Additionally, the subject taught by the teacher promoting the game matters for a number of reasons. Does the teacher have a dedicated classroom (e.g. a history teacher?) or is the teacher in PE and moving around the campus a lot? Are the children all meeting in one class or are they spread across classes? Additionally, classes with fewer strict curriculum requirements (e.g. science, history) allowed for AHPC activities to be integrated into the children's school activities. When teachers had AHPC children in more structured classes (especially math) there may be little room for the teachers to have the creativity/time to integrate AHPC into the school day.

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