Technology to Encourage Outdoor Activity and Learning

Using Technology to Encourage Outdoor Activity and Learning in Children and Young Adults

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Executive Summary

Physically active children and young adults maintain a higher level of health and exhibit reduced risk factors for chronic disease, particular cardio-pulmonary, cardiovascular, and the incidents of obesity. Additionally, outdoor physical activity increases the levels of Vitamin D, reduces incidents of depression, particularly in young women, and increases the focus and control of children diagnosed with ADD and ADHD. Outdoor activity also increases a child’s ability to learn using technology.

Technology contributes to sedentary life-styles and lack of physical activity particularly outdoor activities that provide additional health benefits and learning opportunities. It is incumbent upon technologically related disciplines to utilize technology to reverse the trend of sedentary lives.

In this study, we attempt to determine the success of a game designed specifically to encourage outdoor use, physical activity and learning. The design of Nature Go attempts to increase natural science learning and encourage physical activity in an outdoor setting.

The objective of this study seeks to quantify the impact of games designed specifically to encourage outdoor activity particular in technologically engaged populations who tend to be largely sedentary. Designing games encouraging increased outdoor activity provides health benefits for a large population. Mobile technologies like smart phones, tablets and wearable technology provide an opportunity to motivate children and young adults to participate in unplanned outdoor activity and learning in a natural way.

Through a baseline survey and metrics gathered from players of Nature Go, this study seeks to show improvement in both outdoor physical activity and increased natural science knowledge.
Introduction

Statement of Problem

Outdoor physical activity is critical to health in children and young adults. Physically active children and young adults exhibit fewer occurrences of serious health issues like ADD/ADHD, heart disease, various cancers, obesity, depression, diabetes, stroke, and heart disease. With the proliferation of computers, gaming consoles, smart phones, and social media, children and young adults spend considerable time indoors playing video games, surfing the internet, and participating in various types of social media. These and other technologies contribute to sedentary lifestyles and an increase in health problems. This research proposal seeks to determine whether an outdoor-based video game using mobile technology encourages children and young adults to increase participation in outdoor activity and learning.

Previous Studies

Studies link technology to sedentary behavior in children and young adults. (Bassett, John, Conger, Fitzhugh, & Coe, 2015), (Odiaga & Doucette, 2017)

Increases in physical activity contribute to better mental and physical health including lower rates of depression (Long, Rogers, & Gjelsvik, 2019), better social and organizational skills, increased attention and focus, and more self-discipline (Milon & Slicaru, 2017), reduced ADD and ADHD symptoms (Bowling, et al., 2017). Physical health problems in overweight and obese children and adolescents show improvement with aerobic amounts of exercise. (Garcia-Hermoso, Ramirez-Velez, & Saavedra, 2019)

Deficiencies in Previous Studies

Previous studies exhibit deficiencies in the population studied, the data gathering techniques and/or the reliability of the data gathered.
As Althoff, et al. point out in their study on the Influence of Pokemon Go on Physical Activity – “Accelerometer-defined activity measures are preferred over subjective survey-based methods, which have been found to overestimate physical activity by up to 700%”. Our study will focus on a narrow population of children and young adults between the ages of 12 and 23 who are currently engaged in electronic activities in order to address issues with study populations outside the area of study.

Significance of Study

This study provides insight into the prospect of using game-play to encourage increases in physical activity, outdoor activity and educational opportunities of games in an outdoor environment. Previous studies indicate that increases in physical activity provide better prospects for a healthy life, outdoor activities improve depression (Long, Rogers, & Gjelsvik, 2019), ADD and ADHD (Bowling, et al., 2017), and educational opportunities outdoors increase focus and engagement during educational sessions. (Milon & Slicaru, 2017)

Purpose Statement

The purpose of this mixed methods study will be to examine the effect of games designed specifically to encourage activity and education have on gamers currently experiencing sedentary, indoor life-styles. A convergent-mixed methods design will be used, using qualitative and quantitative data collected in parallel then analyzed separately and merged. In this method, survey data will be used to establish a base line for quantitative analysis. We define the independent variable as the amount of time spent using Nature Go, a game designed for encouraging outdoor activity and education, and the effect this time has on dependent variables of activity levels and natural science education, specifically natural science education as it pertains to real animals. Case studies of Nature Go usage statistics gathered from accelerometer
and pedometer data during game play will explore the effects of this type of game on sedentary life-styles.

**Research Question**

Can an application like Nature Go encourage outdoor activity and learning in children and young adults?

Technology used to encourage an increase in physical activity proves successful in increasing physical activity by 25 percent in the work place and indoors, and keeping subjects engaged for longer periods. (Cibrian, Tentori, & Martinez-Garcia, 2016), (Althoff, White, & Horvitz, 2016), (Edwards, McDonald, Zhao, & Humphries, 2014), (Salzwedel, et al., 2017) (Sra & Schmandt, 2015), (Jamruk, 2017)

Mobile technology provides an opportunity to teach about the natural world. Studies show the use of mobile technology effects learning positively in both an educational and outdoor setting. (Li, Hsin, & Tsai, 2014), (Chen, Lai, Yang, Liang, & Chan, 2008), (Hougham, Nutter, & Graham, 2018)

This study seeks to understand the effect that games, specifically designed for encouraging outdoor gameplay, have on activity in general, outdoor activity specifically and the ability to learn more about the natural world. By enticing gamers to play electronic games, outdoors, using mobile technology, we hope to increase outdoor activity and levels of knowledge about natural science.

**Proposed Research Methodology**

This research initiative proposes to study children and young adults between the ages of 12 and 23 who participate in technological pursuits like gaming, social media, and the Internet. The proposed study continues for a period of 8 weeks.
During initial download of the Nature Go game, users participate in an initial survey to determine a baseline level of physical outdoor activity and technological involvement. This survey provides the basis to determine changes in dependent variables including physical activity and outdoor activity. A cross-sequential method of contact with the study population demonstrates a before and after picture of the changes in physical, outdoor activity for the study population. The amount of time spent playing Nature Go contrasted with the amount of physical and outdoor activity required for the game measures against the determined baseline. A quantitative analysis of the baseline data compared to a similar analysis of data gathered from mobile instrumentation indicates success or failure of the Nature Go design.

It is important to understand the nature of the survey data provides insight into the level of physical, outdoor activity prior to using the Nature Go game. Data gathered during game play determines the effect Nature Go has on changes in physical, outdoor activity.

Furthermore, a qualitative case study of the population provides information pertaining to the determination of success in increasing physical, outdoor activity. Measuring increased knowledge using Nature Go occurs through interactive question and answer sessions about the natural elements encountered during gameplay.

Ethical considerations for this study include potential for harm during gameplay. Participating in outdoor activities presents unique danger for study participants. In order to ensure privacy, all data is gathered anonymously. Study data does not require identification of study participants to complete data analysis.

In the interest of full disclosure, it is important to note some disadvantages of this research study design. Survey data relies on honest evaluation and response by study participants proving difficult to quantify error. Time limits necessitate a short reference period possibly introducing
error in calculations based on the average change in activity and knowledge levels. Expectedly small numbers in the study population may skew results and prevent generalization.

**Proposed Data Collection Instrument**

This study measures changes in physical activity from before and after beginning to play Nature Go. The Survey presented here measures the baseline before introducing Nature Go. Gamers answer these questions during registration of Nature Go.

During gameplay, the three-axis accelerometer and gyro-meter measures and records the number of steps performed by the gamer during game play. These measurements record the amount of activity in order to determine any increase in activity during gameplay. Educational measurement occurs during gameplay by recording the number of correct/incorrect answers given about animals featured in Nature Go. Each of these measurements occur over time in order to determine changes in both physical activity and natural science educational levels.

**Survey Instrument**

Think about and answer the following question in terms of average time per day spent in each activity.

1. How much time do you spend playing video games?
   a. 4-5 hours
   b. 2 – 4 hours
   c. 1 – 2 hours
   d. Less than an hour

2. How much time do you spend walking?
   a. More than an hour
   b. 30 minutes to 1 hour
   c. 15 – 30 minutes
   d. Never
3. How much time do you spend on social media?
   a. 4-5 hours
   b. 2 – 4 hours
   c. 1 – 2 hours
   d. Less than an hour

4. How much time do you spend running?
   a. More than an hour
   b. 30 minutes to 1 hour
   c. 15 – 30 minutes
   d. Never

5. How much time do you spend on the Internet?
   a. 4-5 hours
   b. 2 – 4 hours
   c. 1 – 2 hours
   d. Less than an hour

6. How much time do you spend riding a bike?
   a. More than an hour
   b. 30 minutes to 1 hour
   c. 15 – 30 minutes
   d. Never

7. How much time do you spend in organized sports?
   a. More than an hour
   b. 30 minutes to 1 hour
   c. 15 – 30 minutes
   d. Never
Potential game players complete this survey during registration for downloading the Nature Go game. The survey method necessitates brevity in the data gathered. This survey establishes baseline activity measures for the physical activity level and amount of gaming engagement. Formatting of survey questions should match the standard questionnaire format of mobile devices.

**Project Planning Report**

Figure 1 provides a project schedule and list of major tasks for completion of the Nature Go research project.

![Gantt Chart Project Tasks](image)

*Figure 1: Gantt Chart Project Tasks*
Bibliography


Technology, Outdoor Activity, and Learning


