Dots and Boxes: Recreation of a Classic Game

(Technical Paper)

The Application of Video Games in Childhood Learning Styles

(STS Paper)

A Thesis Prospectus Submitted to the

Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Partial Fulfillment of the Requirements of the Degree

Bachelor of Science, School of Engineering

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Spring, 2023

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction

The United States Educational System is a vast and ever-changing entity. However, from county to county the educational system seems to lack one thing, unity. Counties all across the United States have different standards and equipment due to things like funding and legislature. This causes discrepancies in quality across all counties in America and leads to some school systems being better than others (Schmidt et al., 2011). Not only is the educational system changing, but the world is as well. The world as we know it is becoming dominated by technology in every sector. This is something that society as a whole can take advantage of if beneficial.

The aim of this project is to explore the usefulness or uselessness of video games in childhood education. Video games are able to provide many different experiences for children with different personalities and interests. Video games can also teach children and adults skills that are applicable to their day to day lives and different ways of thinking to improve their cognitive abilities and logistical reasoning (Markey et al., 2020).

The technical portion of this project is a design experience that is being used to design the game dots and boxes. This is a game that could be implemented into the classroom if the benefits of video games are found to be sufficient enough to warrant its use. The type of game that is being designed can be dissected in order to find its benefits and detriments to see if it can be of use for children inside the classroom.

As video games are a technology that relies on the relationships between users and controls, actor-network theory can be used to dive deeper into how much priority the benefits

and detriments of video games are given. Case studies can also be implemented in order to find the proven effects of video game use and how those effects can further relate to children.

Technical Project

Video games have been used in the past for childhood learning in basic ways. The technical portion of this project is dedicated to exploring the viability of recreating the vintage paper and pencil game dots and boxes into a more digital or electronic version. It will be completed for the capstone project of the Department of Electrical and Computer Engineering's undergraduate curriculum, under advisory of Professor Harry Powell.

The goal of the technical project is to design a working digital model of the game dots and boxes and represent it on an LED matrix. The internal components of this project include some very basic hardware such as pushbuttons, joysticks, rotary encoders, wall transformers, seven segment LED displays, a voltage regulator, an LED driver chip, an LED matrix, an LED matrix header board, and a microcontroller. This hardware is to be arranged on a printed circuit board (PCB), in a manner that allows for a 3D printed housing to be made around it. Written software will be uploaded to the microcontroller to act as the brains of the system and will communicate with the various inputs and outputs using a Serial Peripheral Interface (SPI).

If this project can be completed within the $500 budget, then it will suggest that these could be mass produced for a lot cheaper and could be something schools across America add to their classrooms. This project can be completed for cheaper than it will be since the microcontroller being implemented in this project has an excess of computing power needed for this type of application. The housing for this device also does not need to be 3D printed and can be produced using a cheaper but still durable plastic substitute. Finally, massive manufacturers

have access to more components which will allow for capable substitutes to be made to also lower the price of the device.

Benefits and Detriments

Video games have been around for over 50 years, which means that it is very likely that the enjoyment that comes along with them is something that has been experienced over multiple generations. The harms and benefits of video games is something that has been argued by parents and children for just as long. Things like social skills, obesity, violence, and desensitization are topics that are quite important in this argument today.

Obesity and overweightness have been negatively associated with video games since the idea of an overweight teen drinking and eating junk food while playing video games all day became the vision that people thought of when discussing games. It has been shown that screen time has a minimal effect on weight in children. Programs have found that decreasing a child's screen time by 43 percent over the course of a year can cause them to lose on average, one pound. This is of course not a bad thing, but if a child would simply only drink water instead of soda and juice, they would lose around 15 pounds over the same time period (Markey et al., 2020).

The stereotypical image of gamers being extremely antisocial and lonesome are also unrealistic. Studies have shown that the majority of gamers play games with friends or other people leading them to build and manage social relationships just like people do outside of video games. Gamers also cooperate and converse with other gamers in the real world just as often as people who do not participate in gaming. Not only does simply playing video games help to

build and manage social relationships, but any game, regardless of its content, that offers any sort of conflict allows gamers to hone their skills of dealing with conflict, cooperating with people, and feeling the emotion that comes with the result of solving said conflict or not. Video games also offer anonymity to players who do have trouble making friends and relationships outside of gaming; allowing them to experience what it is like to manage social relationships even if it is behind a screen (Markey et al., 2020).

Gamers have often shown signs of desensitization when it comes to gruesome or violent events taking place in video games. They have been shown to react less emotionally when these events take place inside the game they are interacting with. However, the distinction between these reactions taking place in a video game and the real world needs to be made. Even though gamers tend to be less emotional and show less empathy to violent events happening in a video game, they show the same reaction as non-gamers when these events take place in the real world (Markey et al., 2020).

Violence itself is also something that gamers do not seem to struggle with. Seeing violence in video games has the opposite effect. The rates of violent crime after the release of any sort of violent media, video games or horror movie, drop in the days after said release. The reasoning behind this fact being that video games keep people, specifically males, occupied and away from the people that would be considered their victims (Markey et al., 2020).

It is clear that even the harshest criticisms behind video games have no merit and even propose the opposite effect. These ideas should be no different when being implemented in childhood education. Children of all ages would not be subject to the concepts that many people use to discredit the use of video games.

Key Texts

A study by Markey, Ferguson, and Hopkins discussed the myths and benefits of video games on a general level. They began by referencing previous polls to demonstrate the majority view that video games are a waste of time. They then began to discuss the different effects video games have on different aspects of human lives. Effects on social skills, obesity, mood management, visuospatial and cognition abilities, desensitization, real-world violence, and aggression. They concluded their discussion by asserting that video games do not negatively affect people in any of the previously described areas and even go as far as encouraging children and adults to participate in the use of video games (Markey et al., 2020).

Another study by Fontana and Beckerman experimented with the use of video games as a violence prevention technique for second grade children. The children were instructed to take a pretest, play a set of instructional but fun video games related to the idea of preventing violence and aggression, and take a posttest. The results of the pretest and posttest were evaluated and found that most students had demonstrated a greater understanding of anger management skills. The performance of the children was also tracked as they played the games to ensure that they

were putting a sufficient effort into playing and understanding the material (Fontana & Beckerman, 2004).

Ostrander discussed the increased amount of segregation that is occurring in the United States today due to a difference in funding for school districts. This causes segregation because the majority of underprivileged schools are attended by minorities and children of color as they are live in similar communities. Ostrander also touched on the effects that this problem has had inside and outside of the school system such as a lack of accountability in young adults. Finally, it is mentioned that the best course of action is to take legal action as all other proposed solutions have been deemed futile (Ostrander, 2015).

Nabulsi argues that certain types of homework styles better prepare and lead to better test scores for general chemistry students. A study was done that compared test scores of students that received a traditional style of homework and students that completed an adaptive-responsive style of homework. It was found that students that completed the adaptive-responsive style of homework received better test scores on their general chemistry tests (Nabulsi et al., 2021).

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