Thesis Project Portfolio

Dots and Boxes: Recreation of a Classic Game

(Technical Report)

The Application of Video Games in Childhood Learning Styles

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

The technical project is a twist on the way a traditional game of dots and boxes is played. The project is a recreation of the classic game dots and boxes using electric components. The system contains a light emitting diode (LED) array for display, a joystick and rotary encoder for players' input, a push buttons to confirm players' moves, two 7-segment displays as the scoreboard, a microcontroller to control the electrical components, and a software program to determine the logic of the game. The microcontroller deterministically receives player input from the joystick, rotary encoder, and button, then passes it to the software program where the game state will be updated and reflected on the LED array and the scoreboard. The project transforms a game that is normally played with paper and pen into a more efficient and autonomous platform, providing a better experience. The final product includes all the previously listed components combined onto a design printed circuit board (PCB) and is contained in a 3D printed housing to protect the user and PCB from electrostatic discharge as well as providing an elegant look to culminate the entirety of the project into one piece. The game was created to offer the user a different way to play the classic paper and pencil game as well as creating an arcade game like feel.

In the STS research paper, the use and implementation of video games in childhood education is explored. The paper first offers an extensive breakdown of the benefits and shortcomings of video games. Stereotypes such as video games causing kids to be more violent, obese, and desensitized are analyzed in reference to how they could impact a child's life generally, and in a school setting. Other benefits such as the child's improvement in spatial skills are discussed in the same way. A key study involving the way video games boost "brain power" by simply being played is also discussed and how important the utilization of these games could

be for children. The paper also aims to discuss the impact that implementing video games would have on the school system. For example, the adjustments that teachers must make to allow the classroom to run smoothly, and the way administration must discipline students based on bad behavior surrounding the use of video games in the classroom. The paper also discussed the use of traditional learning and teaching styles, and how video games could utilize these styles since they are proven to be most effective. Although not the primary focus of the paper, the problem with school funding is addressed. The paper discusses how school funding, and the implementation of video games should not be another point of division in America. It also touches on the ethics of using extra, unallocated funding to add video games into a school's curriculum when things like free lunch, bonuses for teachers, and protection for all schools remain unaddressed. The final point the paper addresses is an argument for the use of video games in childhood education. The premise of the argument touches on all the previous sections as evidence and offers the tremendous upside in implementing them in the future of American schools.

While it is not obvious how these papers correlate, one could draw the connection between a creation as a potential video game and how it can be used to help aid childhood cognitive skills. Video games are something that children already enjoy, so it would remain a huge benefit if they can be implemented into something that children sometimes find a pain but attend every day, school.