Engineering Non-Intrusive Educational Experiences Through Video Games: The Effects of Alternative Teaching Methods in the Leveling of Modern Education

STS 4500 Prospectus

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Overview:

As an avid video-gamer, I have attributed a large amount of my learning to the games I played growing up. While teaching in many settings as a tutor, swim coach, and older brother, I've found that video games offer the perfect environment to recklessly explore and experiment which accelerates the learning process. In this project, I aim to evaluate the various types of videogames and determine the various factors that play into the relationship between "educational" and "fun". By comparing many games from the past, I aim to deduce what mechanisms will create games that can be both exciting and intellectually stimulating.

Positionality:

Growing up, my mother, a math education professor, urged me to drive my own learning. Whether it be calculating the cost of 3.6 pounds of grapes or strategically organizing sets of coupons to get the best deal, I indulged in the various ways that math and logic dictated our world. As I grew up, I learned about math, economics, people, and even grit through both the real-world and the video games I played. However, the simulated environments of video games allowed me the ability to fail and press restart which served as a great mental model for persistence.

This perspective of learning has stayed with me which is why I'm a firm believer in expanding the avenues of learning to more creative mediums. Though I do believe in the benefit and continual need for rigorous coursework, I think that video games provide for dynamic learning environments that mirror the real world more than any worksheet or textbook ever could.

Problematization:

Previous research has investigated the effectiveness of video games as a learning tool, but the mechanisms by which these games facilitate learning and the impact of their ability to retain student attention and foster intellectual curiosity remain largely unexplored. Despite the growing popularity of video games as educational tools, there is a lack of empirical evidence examining the specific features and characteristics of these games that contribute to their effectiveness in promoting learning. Furthermore, it is unclear why students can sustain their focus and retain information while also being intellectually stimulated by the games.

This research is necessary to understand the potential of video games to serve as effective learning tools and to inform the development of educational games that are both engaging and educational.

Guiding Question or Main Argument:

How can we analyze and access the specific mechanics of various video games for their ability to entertain? Additionally, how do these mechanics guide meaningful lessons?

Projected Outcomes:

By formalizing the underlying mechanics that make games both exciting to people while also exploring what games implicitly teach real-world skills, I hope to empower researchers and game developers to build better gaming experiences for students. With this, I hope to give students in all parts of the world access to a more resilient environment that they can experiment and learn from without fear of financial burden. In doing this, the hope is that students, parents, and teachers will all have a more favorable view on the positive impact on video games in transforming the learning atmosphere of the 21st century.

Technical Project Description:

Leveraging my background as an avid video-gamer with a love for open-world games like Minecraft, along with my expertise in software engineering through selling business-to-business software, this project embarks on an in-depth analysis of various video games. The primary objective is to identify the specific mechanics that sustain player engagement and determine how these mechanics can contribute to non-intrusive educational experiences.

The research process begins by holistically evaluating the games, encompassing elements such as artwork, music, and user tests to collect data on engagement levels. Once non-essential elements like artwork and music are abstracted, the tests will be repeated to pinpoint the specific mechanics that maintain user interest.

The goal is to apply the findings from this project to inform the development of video games that not only captivate players but also provide non-intrusive educational experiences. By understanding the factors contributing to the success of these games, developers can create more engaging educational games that strike a balance between enjoyment and learning.

Preliminary Literature Review & Findings:

Many engineers and game developers have explored the intersection of video games and education, creating educational games and leveraging gamification techniques to enhance learning experiences. Many startups and game studies have focused large sums of money towards developing engaging gameplay mechanics, interactive content, and integrating learning outcomes into games. Similarly, STS researchers have examined the social, cultural, and ethical aspects of gaming, exploring issues such as digital literacy, online communities, and the impact of gaming on education and social interactions [3,6]. Communities, especially on website such as Reddit, have emerged around the topic, with forums dedicated to discussing and sharing experiences about educational gaming [4,5]. Nonprofits and educational institutions have also recognized the potential of games for learning and have begun research exploring this domain [7].

These previous endeavors have faced challenges, such as striking the right balance between entertainment and education, ensuring inclusivity and accessibility, and addressing ethical concerns related to gaming and learning. Moreover, the rapidly evolving nature of

technology and gaming presents a constant challenge to innovate. My work aims to build upon the efforts of engineers, STS researchers, and communities by identifying specific game mechanics that contribute to both engagement and non-intrusive educational experiences. By conducting an in-depth analysis of various games through a carefully planned, holistic approach, I will address some of the difficulties faced by earlier researchers and practitioners.

By recognizing and addressing the challenges and limitations in the existing literature and practices, this project can contribute to a deeper understanding of the potential for video games in education. Building upon this past research will help developers create more engaging educational games that strike a balance between enjoyment and learning, while also prioritizing global accessibility.

STS Project Proposal:

The project described is a good fit for the field of STS due to its interdisciplinary approach, examination of the relationship between technology and society, and relevance to current societal issues. The project brings together elements from multiple disciplines including game design, psychology, and education, analyzing it for both its impact on individual users as well as a collective society. The project's focus on the impact of video games and its examination of non-intrusive educational experiences highlights the importance of considering the social implications of technology. With the increasing use of video games in education, this project addresses a current and relevant issue in society, making it a valuable contribution to our current and the future dynamics of education and people.

This project best fits under the concept of affordance theory because it allows us to explore the intricacies of video game mechanics and their potential for fostering non-intrusive educational experiences. Affordance theory was developed by James J. Gibson, an American

psychologist, in the context of ecological psychology. Gibson first introduced the concept of affordances in his 1966 book "The Senses Considered as Perceptual Systems" [1]. In the context of video games, affordance theory refers to the way game elements and mechanics invite players to interact, engage, and learn in specific ways. Affordance theory allows us to uncover the inherent qualities of video games that make them engaging, which enables developers to create better experiences for players. Additionally, affordance theory encourages us to explore how game mechanics can be designed to facilitate learning in a non-intrusive manner, which has immense potential to transform the educational landscape [2,3]. This epistemological approach to this investigation, will be to embrace a blend of analytical and exploratory methods . We'll start with a keen observation of the games, breaking them down into components, and then reassembling the pieces to try and understand it like art.

To fully appreciate the affordances offered by various video games, we must adopt an interdisciplinary lens. This investigation will encompass elements of psychology and design, weaving them together to form a holistic understanding of the gaming experience. By combining this approach with an interdisciplinary and exploratory mindset, we hope to aid in the understanding of the complex interplay between engagement and education in the realm of video games.

Experimental plan for the project:

First, I intend to select a diverse set of video games from IGN's top-rated games of the year between 2010 and 2022, known for their engagement and popularity among players. These games should encompass various genres and gameplay mechanics. Next, I will assess the chosen games in their entirety, considering aspects such as artwork, music, and other components. For

the most representative games, I aim to conduct user tests with a sample group of participants to collect data on engagement levels and their overall experiences while playing the games. Subsequently, I will strip away extraneous elements like artwork and music from the games to simplify them, and then repeat the user tests to observe if engagement levels remain consistent. Once I obtain those engagement levels, I will utilize the user test results to identify which specific mechanics are most effective in sustaining user engagement. By examining each identified mechanic, we can quantify their potential to afford improved educational outcomes. Based on the findings, I plan to refine the identified mechanics and hope to collaborate on integrating them into new, experimental games.

Barriers & Boons

Potential blind spots and limitations in this study may stem from my positionality and background, which could inadvertently influence the selection of games, interpretation of user experiences, and the identification of mechanics. Financial and time constraints could limit access to diverse games and recruitment of a sufficiently large and diverse sample group, which may restrict the depth of the analysis.

Collaborative barriers, such as the need for expertise in psychology or game design, may also impact the study's efficacy. Additionally, my inexperience with certain methodologies could limit the robustness of the research.

To address these issues, I can enhance my interview techniques and engage in extensive reading to deepen my understanding of the subject matter. Seeking out higher quality literature and gaining insights from the gaming community can further improve the study's validity. Additionally, I can work to collaborate with experts in relevant fields which can help offset knowledge gaps, ensuring a more comprehensive and nuanced understanding of the topic.

References

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