ANNOTATED BIBLIOGRAPHY BY: PRANAVSAI GANDIKOTA

Reflective Cover Letter

What I seek to find in this study is the connection between game elements and the effectiveness and productivity of gamification on a student's learning. Aiming to contribute to the fields of software development, educational technology, and the gamification of education, and by understanding this, game designers and companies that make learning apps would be able to incorporate such parts to help in student retention and overall productivity of learning outcomes. This paper has been written with a smaller audience in mind with not only my professor and peers, but also different software engineers who are involved in gamification of a learning app and other authors who have conducted past research to which I will be extending upon. Having considered the audience, I decided to write in a more simplified way of explaining the topic.

While working on the annotated bibliography, I tried to find sources which were like my topic with statistical data. I have also found some sources which included a review or a summary of various sources so I would get a general view regarding this topic. Apart from the papers which supported my topic, I have also found a source of opposition as to why gamification is not good and the negative effects of it so I would have opposing points to which I could find responses to. It would also provide some insight into why certain areas of gamification are not working as well. While making my draft some of the obstacles came across were not knowing how to format an annotated bibliography, but after going through some examples I have seen how they are written in general.

Through this work, I will be covering the course outcomes of generating inquiries and information literacy due to us evaluating various sources, questioning what they are trying to say and finding the information we want, and checking their credibility for relevancy. Research genre production would also be a major part since we will be working with research constraints. By conducting surveys and analyzing the results, we would also be contributing knowledge with primary evidence. Finally, it is important that we also check our work and modify based on the feedback we receive hence covering the outcome of revision.

Introduction

With the coming of modern technology and games, gamification of education has started to gain popularity in many fields due to the benefits it holds. Till date, there have been many articles, books, and research papers regarding various aspects of gamification such as the impact it has on motivation, the effectiveness of certain game elements and how psychology plays a role in making different students react differently to such learning games. Gender and personality were also researched to see the effects they have on a person's learning through gamification.

In 2018, Chapman and Rich investigated how individual game elements can influence a person's motivation with the inclusion of statistical data regarding how different elements were effective, giving an idea into how different students engage with a game element. This was also researched in 2024 by Ren et al. performing a meta-analysis to compare gamification and serious games, showing results on how gamification was more superior. Although these papers contributed to talking about how motivation in a game played a key role in how a student learned, it did not really talk about how education was impacted due to the elements, rather, explained how an element motivated a student more to learn.

Some other researchers also investigated how gamification affects effectiveness. In 2022 Luo analyzed forty-four studies regarding gamification in which he identified the main components which affect engagement and learning. Denden et al in 2021 investigated how gender and personality shapes a student's perception over a game element. All these showed that we must also understand the person using the gamified product when making something as individuals may have different learning styles.

There were also several discussions as to regards if gamification is more than just rewards and points and if there is really any positive side effect to such things. Such an example was in 2012 in a paper by Rice, who argued that narratives, problem solving and engagement were also major parts of making an effective gamified learning app saying that only rewards and points are not enough. There were also articles of opposition such as by Toda et al. who in 2018 warned about the negative effects of games when they are not implemented correctly. This gives us a certain idea as to what to avoid.

My research would play the role of investigating how these educational games lead to improved productivity and literacy. Previous studies have found how motivation and engagement have played a big role, while some have found which element is more generally preferred but I will be going through archival research while also conducting surveys to find how different students find their productivity is based on the gamified games they have played in educational settings. By comparing with and expanding upon past research, I will be presenting a more modern updated collection of past data with modern data additions. Throught this study, I hope to answer the question on how different elements would increase productivity in a student's learning and if there is retention in what they learned before in a gamified game.

To answer such questions, I will be conducting a survey which will be asking students several questions regarding which gamified elements they feel are the most impactful for them and how they affected their overall productivity, motivation, and engagement in their opinions. While the motivation and engagement parts have past data already

collected, I would be able to find trends and merge my data with it to get a more updated conclusion as to making a good, gamified game.

Sources and Annotations

Chapman, Jared R., and Peter J. Rich. "Does Educational Gamification Improve Students' Motivation? If so, Which Game Elements Work Best?" ***Journal of***

***Education for Business*, vol. 93, no. 7, 2018, pp. 315–22, https://doi.org/10.1080/08832323.2018.1490687.**

This source provides data regarding the impact of game elements on motivation in the gamification of education. It also provides statistical data regarding this and offers a list of several common game elements which have been used in many past games. Like my topic, it investigates the effects of gamification, and which elements work best in terms of how motivated it makes a student. It also discusses how these elements affect students in different environments and why.

This research paper is written by Chapman and Rich, professionals from the Woodbury School of Business and Instructional Psychology and Technology, respectively, and serves as a relevant source for my research as it investigates which game elements work best in the gamification of education. Despite being published in 2018, with many new games and elements being introduced nowadays, the paper still brings useful information such as statistical data on several game elements and the motivation level of each element based on a 124-student survey in 2014-2015. While this paper seeks to find the impact of individual game elements on motivation, my paper seeks to find the educational impact that different games with game elements cause and which common game elements tend to create an increased amount of literacy in terms of student survey data and past statistical data. This paper's descriptions and statistics on motivation of elements would hopefully provide a correlation with the educational impact. Several game elements used in this paper may also be certain options in the surveys I conduct among students.

Denden, Mouna, et al. "Effects of Gender and Personality Differences on Students' Perception of Game Design Elements in Educational Gamification." ***International Journal of Human-Computer Studies*****, vol. 154, 2021, pp. 102674-, https://doi.org/10.1016/j.ijhcs.2021.102674.**

This study talks about how gender and personality affect students' experience in a gamified environment. After 189 students participated in a three online gamified course, the five-factor model was applied to assess each game element and how it related to personality and self-determination. The results of this study showed that personality and gender did in fact affect how students perceived a game element with males and females responding differently with different personal traits.

This peer reviewed source was written by several authors of all who worked at different universities and laboratories in topics of smart learning, management, innovation, and technology making them suitable to talk about this topic. They have also conducted a multiple regression analysis on students' perceptions of game elements. It provides some ideas about how different individuals different understandings in gamified learning must create more personalized gamification. Unlike the other sources, this one focus particularly on a certain topic, moreover one of the drawbacks of data collection of how gamification affects a student, which is personality and gender. There is also statistical data regarding a student's trait and their gender and how they are correlated to a game element and a student's perceptions on it. This is helpful in my writing, especially in parts where I talk about how inclusion affects learning in gamification.

Luo, Zhanni. "Gamification for Educational Purposes: What Are the Factors Contributing to Varied Effectiveness?" *Education and Information Technologies*, vol. 27, no. 1, 2022, pp. 891–915, https://doi.org/10.1007/s10639-021-10642-9.

This study investigates how game elements improve learning, engagement, and performance. The author analyzed forty-four articles that covered the effectiveness of gamification, what methods were used to see how successful they were, and the varied factors that may affect the outcome. The study explores what makes gamification engaging, analyzing different elements such as goals, challenges, and competitions, and how these factors influence learning. Engagement served as the main indicator of measuring the effectiveness of gamification. This is quite like my topic and will, in a way, be what I would like to investigate as well, except in modern times—four years have passed since the publication of this paper. The factors that affect the outcome would be useful information to consider given the data I collect, such as limitations in small sample size and control group absences. The measures of assessing the effectiveness of educational gamification would also serve as ideas for my data collection. It ends by stating that more investigations into individual game elements would serve as improvements yet to be made in the future.

This peer-reviewed source was written by Zhanni Luo, a researcher and professor working on topics related to gamified learning tools. Its credibility comes from the revision of forty-four articles and bibliometric analysis. This paper would prove useful to my topic since it provides evidence and clarifies some concepts, which would help me explain the topic in a more refined way. These effects of education would combine with the other past archive research I have found, which talks about motivation and the

psychology of different learning aspects of gamified games, providing potential connections between them.

Ren, Jiaopin, et al. "The Impact of Educational Games on Learning Outcomes: Evidence from a Meta-Analysis." ***International Journal of Game-Based Learning*****, vol. 14, no. 1, 2024, pp. 1–25, https://doi.org/10.4018/IJGBL.336478.**

This study discusses the impact of serious games and gamification on learning and motivation. Results showed that gamification has a greater effect than serious games, particularly on motivation. The paper explores student engagement, knowledge retention, and how these aspects change in different environments. There is a missing part of the research regarding different mechanisms that drive effects, which my research will attempt to cover significantly.

This peer-reviewed source, written by Jiaopin Ren of Zhongyuan Institute of Science and Technology, has been published in the *International Journal of Game-Based Learning*, a credible journal. Although my research is not related to serious games, looking into the elements of gamification mentioned in the paper would provide useful data regarding different game elements that I would discuss in my paper. Like the paper *Does Educational Gamification Improve Students' Motivation? If so, Which Game Elements Work Best?* This study also examines how motivation is affected by the gamification of games. In my paper, I will be focusing on the productivity of gamification, but gaming elements from this paper may be used in my study along with other elements in conducting surveys.

Rice, John W. "The Gamification of Learning and Instruction: Game-Based Methods and Strategies for Training and Education." ***International Journal of Gaming and Computer-Mediated Simulations*****, vol. 4, no. 4, 2012, pp. 81–83, https://doi.org/10.4018/jgcms.2012100106.**

This book review by Rice talks about how effective gamification is more than just rewards badges and points, but careful design with elements like a narrative, problem solving and engagement of the player. It includes case studies such as firefighter training simulation REVAS, alternative reality games in conferences and Foldit, a game for scientific discovery. Kapp also talks about scaffolding, cognitive apprenticeship, and flow theory which are learning theories which help in supporting the point that games make an immersive and effective learning experience.

This peer reviewed source is credible due to its theory and research conducted in presenting the evidence. Unlike the other sources, this book talks about how gamification can be applied in a broader field from education to cooperation. Similarly, in the other papers, there is also a discussion about motivation (intrinsic and extrinsic) and how a player's perception affects the learning outcomes. This source would be of use in my paper as it gives an idea regarding the real-world applications for which gamification can be used and with the contrasting of this book with other pieces of literature, it also gives different views on this topic by other experts in the field.

Toda, Armando M., et al. "The Dark Side of Gamification: An Overview of Negative Effects of Gamification in Education." ***Higher Education for All. From Challenges to Novel Technology-Enhanced Solutions*****, vol. 832, Springer International Publishing AG, 2018, pp. 143–56, https://doi.org/10.1007/978-3-319-97934-2_9.**

This paper discusses the different downsides of gamification, with particular emphasis on performance loss, indifference, undesired behaviors, and declining effects. The study found that elements such as leaderboards, points, and badges were associated with negative outcomes. The authors argue that implementing game elements without considering their educational needs or motivational effects may hinder a student's learning. The paper provides insights into how to avoid ineffective gamification.

This peer-reviewed paper was written by several professors from the Institute of Mathematics and Computer Science and is credible due to its mapping study approach, analyzing data from multiple studies. Despite opposing my topic, this paper provides counterarguments that I can respond to and consider when writing about the effectiveness of different game elements. By comparing results in this paper with those of other studies, I would be able to find potential causes of dips in the data collected about productivity and motivation in connection to a game element. Hence, I will be able to acknowledge the negative effects of gamification in my paper.