

Assignment 2

Rudolfs Praulins
rpraulins3@gatech.edu

1 RESEARCH LOG

Background

As I explore the idea of using a digital board game to enhance the classroom experience, I have reviewed several papers examining the use of board games and video games in educational settings. The majority of these articles suggest that engaging and enjoyable games can significantly boost student motivation and, in some cases, positively influence their behavior. However, some articles express concerns about excessive reliance on video games or technology in the classroom, as it may contribute to addiction, negatively affecting students' academic performance and mental well-being. This week, I aim to delve deeper into this topic, exploring strategies for creating engaging and educational games while mitigating potential side effects of increased technology use in the classroom.

Papers

- Poole, F. et al. (2019). *Exploring the pedagogical affordances of a collaborative board game in a dual language immersion classroom*. Retrieved from https://onlinelibrary.wiley.com/doi/epdf/10.1111/flan.12425?saml_referrer
 - Found on Google Scholar by searching “classroom boardgame” and looking at articles since 2019.
 - This article investigates the use of educational board games for language learning and peer interactions in a second-grade dual-language immersion (DLI) classroom. It highlights how well-structured board games can facilitate meaningful communication and learning opportunities. The study advocates for incorporating board games in DLI classrooms to promote content and language learning.
 - Main takeaways:
 - Board games effectively encourage peer interactions and collaboration.
 - Combining different educational topics within a game can be beneficial.
- Scirea, M. & Valente, A. (2020). *Boardgames and Computational Thinking*. Retrieved from <https://dl.acm.org/doi/abs/10.1145/3402942.3409616>

- Found on Google Scholar by searching “classroom boardgame” and looking at articles since 2019.
- This article explores the integration of board games into Computational Thinking (CT) education. It analyzes various board games, such as Robo Rally, The Dragon & Flagon, Space Cadets, and Crabs & Turtles, to identify game mechanics that support CT concepts. The authors propose criteria for educators to select CT-relevant board games.
- Main takeaways:
 - Board games can effectively teach CT by fostering skills like sequential thinking and pattern recognition.
 - Common aspects of board games that promote CT include action queues, cooperation, and resource management.
- Lee, V. et al. (2020). *Introducing Coding through Tabletop Board Games and Their Digital Instantiations across Elementary Classrooms and School Libraries*. Retrieved from <https://dl.acm.org/doi/pdf/10.1145/3328778.3366917>
 - Found on Google Scholar by searching “classroom boardgame” and looking at articles since 2019.
 - This paper suggests using school libraries and media centers as resources for teaching coding alongside traditional classroom instruction. It explores the use of tabletop board games to teach core programming concepts, followed by practical coding activities using the Scratch development environment.
 - Main takeaways:
 - School libraries can play a role in computer science education.
 - Reducing the time gap between game play and coding is important.
 - Promoting game circulation can prevent boredom.
- Chen, K. & Chi, H. (2022). Novice young board-game players’experience about computational thinking. Retrieved from <https://www.tandfonline.com/doi/epdf/10.1080/10494820.2020.1722712?needAccess=true&role=button>
 - Found on Google Scholar by searching “classroom boardgame computing” and looking at articles since 2019.
 - This paper discusses the use of the "Coding Ocean" (CO) board game to teach computational thinking (CT) skills to children. It highlights the positive experiences of first-time players with CO, emphasizing the engaging and

strategic nature of the game. Students improved their understanding of CT concepts.

- Main takeaways:
 - Students developed their own strategies and improved decision-making over time.
 - Teachers became more engaged after witnessing student success.
- Seguar, D. (2021). EdTech in Developing Countries: A Review of the Evidence. Retrieved from <https://academic.oup.com/wbro/article/37/2/171/6333790>
 - Found on Google Scholar when searching “edtech problems” and looking at articles since 2019.
 - This paper examines the significance of educational technology (EdTech) in addressing educational challenges in developing countries. It categorizes existing studies into four themes and suggests that EdTech interventions focused on self-led learning and instructional enhancements are the most effective.
 - Main takeaways:
 - Self-led learning and instructional improvements are effective EdTech interventions.
 - Local policies need to encourage EdTech solutions for success.
- Pillay, H. et al. (2014). Cognition and Recreational Computer Games. Retrieved from <https://www.tandfonline.com/doi/epdf/10.1080/08886504.1999.10782624?needAccess=true&role=button>
 - Found on Google Scholar by searching “edtech gaming” with “Any time” filter.
 - This paper analyzes whether recreational computer games can enhance students' cognitive processes, such as forming complex mental models and making inferences. The results indicate that playing video games can improve problem-solving skills.
 - Main takeaways:
 - Video games engage cognitive processes similar to studying and deliberate practice.
 - Games can significantly help students improve their problem-solving skills.
- Dondlinger, M. (2007). *Educational Video Game Design: A Review of the Literature*. Retrieved from

<http://hypermedia468.pbworks.com/w/file/fetch/82077116/Dondlinger2007EducationalVideoGameDesign.pdf>

- Found on Google Scholar by searching “edtech gaming” with “Any time” filter.
- This paper is a review of the literature and research done on educational game design. Specifically they examine how design can induce learning. The paper concludes that number of distinct design elements, such as goals, rewards, narrative context, rules, and interactivity, are necessary to stimulate desired learning outcomes.
- The main takeaways:
 - Narrative context in games can enhance engagement, even if unrelated to the learning outcome.
 - Gender-based assumptions about game preferences are not accurate.
- Farchakh, Y. et al. (2020). *Video gaming addiction and its association with memory, attention and learning skills in Lebanese children*. Retrieved from <https://capmh.biomedcentral.com/articles/10.1186/s13034-020-00353-3>
 - Found on Google Scholar by searching “edtech gaming” with “Any time” filter.
 - The authors performed a qualitative study on 566 school children (age 9 - 13) to see whether addiction to video games decreases cognitive abilities, such as memory, attention, spacial organization and others. The study concluded that there is a strong correlation between decreased cognitive processing and video game addiction. It should be noted that the study interviewed the parents of the children and their perception of the child rather than the children themselves.
 - Main takeaways:
 - Research should involve opinions of the group being studied (e.g., children) rather than relying solely on another group's (e.g., parents) perceptions.
- Treher, E. (2011). Learning with Board Games. Retrieved from http://destinagames.com/pdf/Board_Games_TLKWhitePaper_May16_2011r.pdf
 - Found on Google Scholar by searching “edtech gaming” with “Any time” filter.
 - This paper highlights the importance of using board games as effective learning tools in both corporate and educational settings. It challenges prevailing myths about learning, such as the idea that listening to experts or gaining experience alone leads to effective learning. The paper emphasizes that combining hands-on and heads-on learning is crucial for successful education.

- The main takeaways:
 - Board games are efficient and cost-effective resources for incorporating both heads and hand-on learning
 - Listening to experts in field is not the only effective way of transferring knowledge and teaching
 - The same issue that afflict the general classroom can often be also found in large businesses
- Romiszowski, A. (2004). How's the e-learning baby? Factors leading to success or failure of an educational technology innovation, Retrieved from <https://library.oapen.org/bitstream/handle/20.500.12657/53333/1/978-3-030-83255-1.pdf#page=202>
 - Found on Google Scholar by searching “edtech failure” with “Any time” filter.
 - The paper highlights the ethical issues surrounding the use of educational technologies, including data privacy concerns and the monetization of student data. The author emphasizes the role of faculty in modeling academic integrity and suggests pedagogical strategies to reduce the temptation for students to engage in contract cheating - the practice in which a student hires a third party to complete their assignments. Ultimately, the author calls for a more comprehensive and ethical approach to maintaining academic integrity in the digital age.
 - Main takeaways:
 - The responsibility for promoting academic integrity should not solely rest on students but also extend to faculty and institutions.
 - Faculty members should model integrity in their teaching practices and use of educational technologies.
 - High-cost homework systems and inaccessible technology, can increase student stress and potentially push them toward unethical behavior.
- Lamas, P. et al. (2017). Essential features of serious games design in higher education: Linking learning attributes to game mechanics. Retrieved from <https://bera-journals.onlinelibrary.wiley.com/doi/epdf/10.1111/bjet.12467>
 - Found on Google Scholar by searching “edtech game design” with “Any time” filter.
 - The paper explores how university teachers can design and implement serious games (SGs) for teaching and learning in higher education. The authors reviewed

over 160 papers and found diverse conceptualizations of SG design and integration with learning elements. The authors proposed a taxonomy of learning-game attributes to help designers and game developers align learning outcomes with game elements.

- Main takeaways:
 - Integration of learning elements into game design often leads to confusion and uncertainty about how to design learning activities, feedback, and assessment within the game.
 - Teacher roles in guiding student learning through games are unclear and need careful consideration during the design stage.
- Martins, F. et al. (2018). Effect of the board game as educational technology on schoolchildren's knowledge on breastfeeding. Retrieved from <https://www.scielo.br/j/rlae/a/QQvnNYCbrzShCkKJyZfSBJg/?format=html>
 - Found on Google Scholar by searching “edtech boardgame” with “Any time” filter.
 - The study aimed to evaluate the effectiveness of the board game as an educational tool to enhance schoolchildren's knowledge of breastfeeding. The group of children that played the boardgame showed significantly increased knowledge of breastfeeding compared to the children in the control group. The board game was particularly effective for younger children (ages 8-9) and girls.
 - Main takeaways:
 - Games can be a good medium to explaining somewhat sensitive topics thus reducing possible awkwardness or embarrassment
- Kimmons, R. et al. (2021). Trends in Educational Technology: What Facebook, Twitter, and Scopus Can Tell us about Current Research and Practice. Retrieved from <https://link.springer.com/article/10.1007/s11528-021-00589-6>
 - Found on Google Scholar when searching for “edtech trends” and applying the “Since 2019” filter.
 - The paper analyses various EdTech trends particularly in the context of the COVID-19 pandemic. Overall, the analysis calls for a more diverse and adaptable approach to educational technology research and practice, with a strong emphasis on addressing ongoing issues and fostering equitable learning opportunities.
 - Main takeaways:

- The COVID-19 pandemic prompted significant changes in educational technology, such as the rapid adoption of remote learning.
 - The long-term impacts of the pandemic on students and institutions are still unclear
- Brooks, J. (2023). 51+ Best Educational Board Games for K-12 Learning Fun (2023 Update). Retrieved from <https://hessunacademy.com/educational-board-games/>
 - Found on Google when searching “popular educational boardgames”.
 - The article outlines over 50 popular boardgames that can be used as educational tools, that can improve or teach various skills to both children and adults. The article groups the games in several categories like math games, reading games or STEM games. Each game is given a short summary and main skills it helps with improving.
 - Main takeaways:
 - There are numerous examples that can be used as inspiration for making an engaging educational game
 - It seems that a good educational games can be enjoyed by both children and adults
- Greenhalgh, S. et al. (2019). The Fun of its Parts: Design and Player Reception of Educational Board Games. Retrieved from <https://www.learntechlib.org/p/184644/>
 - Found on Google Scholar when searching “boardgames fun” and applying the “Since 2019” filter.
 - The paper discusses the use of board game features as a framework for teachers to select and evaluate educational games. The paper provides examples of how teacher candidates from various subject areas can use this framework to find suitable educational games for their teaching contexts.
 - Main takeaways:
 - Themes play a significant role in predicting players' reception of board games. Certain themes, like historical periods, can positively influence player ratings, while others, such as media-based themes, may have a negative impact
 - The students themselves should be involved in the selection of educational games

Synthesis

Last week, I examined papers providing an overview of the EdTech field. This week, my focus shifted towards the effects and applications of board games in EdTech, aligning with my intended project for the course. Some papers indicated that board games serve as excellent tools for fostering and enhancing soft skills such as collaboration and communication (Pool et al., 2019). Additionally, others recognized the potential of board games for improving technical skills like computational thinking (Scirea & Valente, 2020). I also delved into specific design considerations that can enhance the prospects of creating successful educational games (Greenhalgh, 2019). Dondlinger's study (2007) also highlighted that games traditionally associated with boys could be equally enjoyable for girls if the game is introduced to them. Lastly, several papers underscored the significance of teacher and parent involvement in game selection and gameplay (Greenhalgh et al., 2019; Chen & Chi, 2022).

While many papers extolled board games as valuable learning tools and recognized the entire field of EdTech as an effective and cost-efficient means of teaching, I sought to uncover the field's challenges as well. A search for terms such as "EdTech problems" or "EdTech failures" yielded several articles pinpointing various issues in the domain. For instance, one article identified an increased likelihood of student cheating when exposed to online learning environments (Romiszowski, 2004). Another article posited that gaming addiction could negatively impact students' academic performance and cognitive abilities (Farchakh et al., 2020). This suggests that introducing more games into the classroom setting might exacerbate addiction issues for some students.

In summary, these papers demonstrate the diverse applications and advantages of educational technology and games within learning contexts. Simultaneously, they provoke critical questions regarding ethical considerations, inclusivity, and the roles of teachers, parents, and students in facilitating effective learning.

Reflection

This week's research appeared much more focused to me. I gained a comprehensive understanding of the existing research on board games in education and acquired valuable insights for consideration during the project. One aspect that hadn't crossed my mind previously was the significance of teacher and parent involvement, not only during the planning phase when they can assist in selecting suitable games but also during actual gameplay. Games that engage both adults and children have a higher likelihood of facilitating

learning. Additionally, I must prioritize accessibility and inclusion in the project to prevent inadvertently excluding certain groups of potential players.

Planning

In the upcoming week, I intend to allocate some time to delve deeper into whether the field of EdTech offers insights into the most effective and inclusive medium for teaching. I want to develop a digital board game and currently lean towards a web application as the most suitable delivery method. However, I should explore alternative possibilities. A web app necessitates that every participant possess a digital device and an internet connection, which may limit accessibility. There might be alternative ways to provide the same experience with fewer constraints. Additionally, I plan to investigate students' preferred learning methods. While I currently contemplate using quizzes and flashcards as the primary means to stimulate learning in the digital board game (*Figure 1* below), I am eager to explore other potential options.

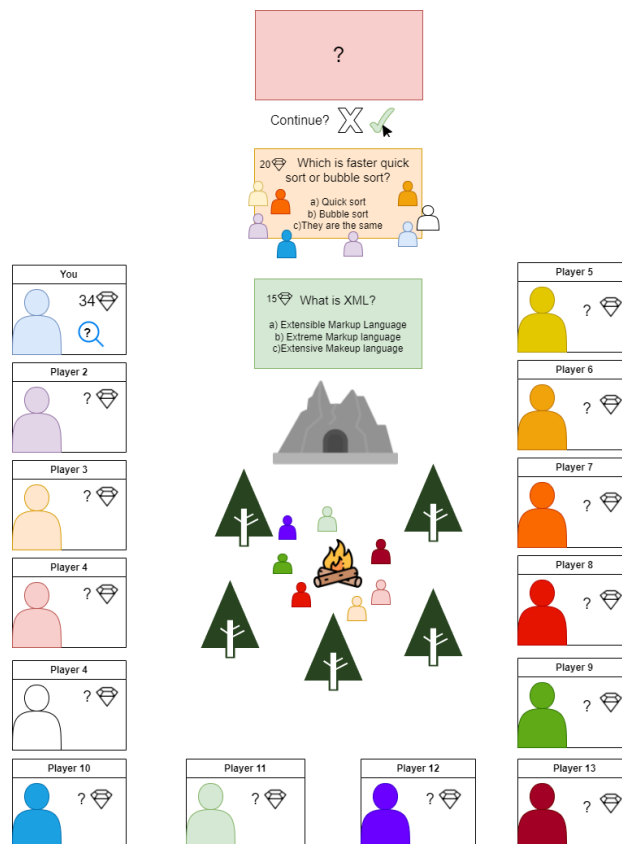


Figure 1—Wireframe for a digital EdTech focused adaptation of the boardgame [IncanGold/Diamant](#) in which the students try to compete with each other to complete a dungeon of quizzes created by the dungeon master (i.e. the teacher)

2 ACTIVITY

The question of whether online education and MOOCs have an equalizing effect appears to be the wrong question to ask. Online education provides an alternative option to traditional on-site education and often at a much lower cost. This means that people who previously couldn't afford on-site education or couldn't visit the location, perhaps due to some disability, now have the option to learn from the comfort of their homes. If anything, this appears to increase equality, as education that was previously inaccessible is now within reach. But even if we ignore this and entertain the idea that online education and MOOCs decrease equity somehow, then the question we should ask is: how do we fix that? The answer is fairly simple - internet access. *Figures 2* and *Figure 3* below outline worldwide internet and hardware (personal computer) access.

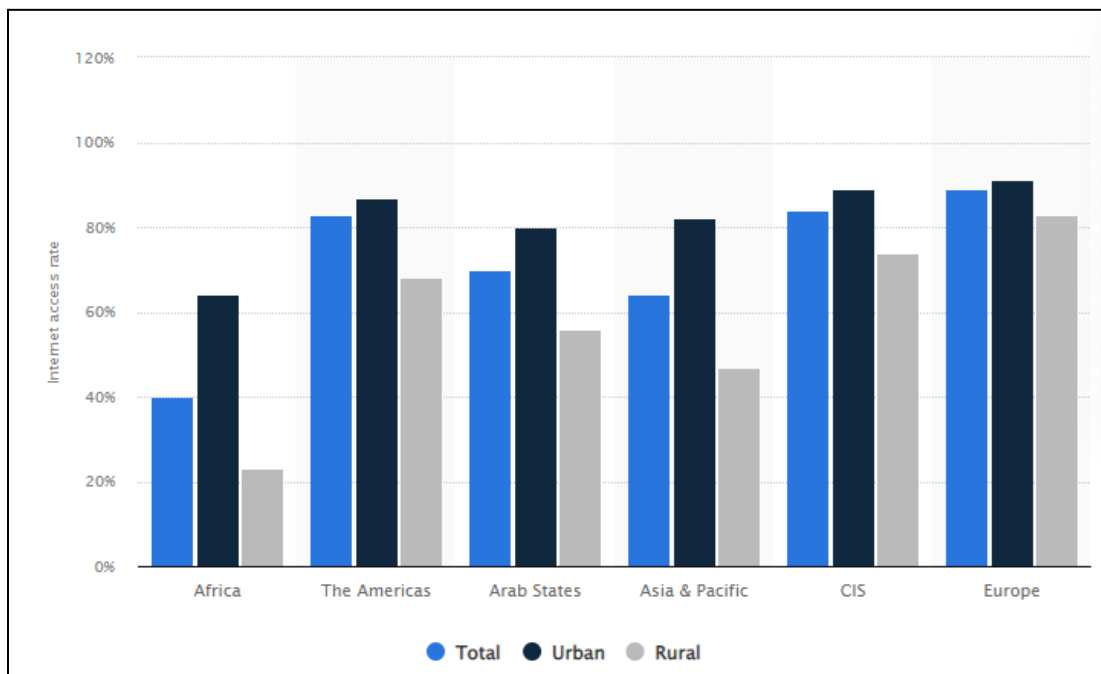


Figure 2—Internet access worldwide as of 2022. Retrieved from [Statista](#)

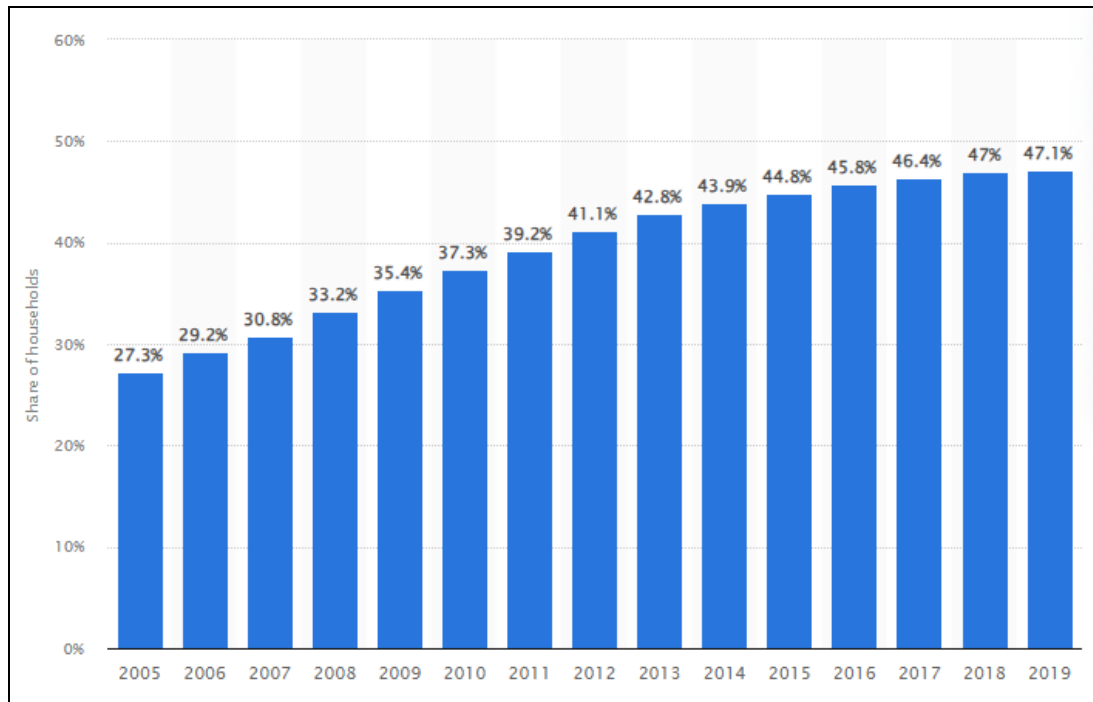


Figure 3—Share of households with a computer worldwide from 2005 - 2019.

Retrieved from [Statista](#)

These figures tell a simple story - roughly 50% of the world's population does not have access to online education simply because they can't. Does the fact that online education requires internet access and a device capable of displaying the learning material alienate some groups of people? Yes, but it has still made education much more accessible. According to a UNESCO report, roughly 235 million students are enrolled in universities. Though the report does not specify whether all of these students are on-site students, let's assume that this is the case. With a global population of 7.8 billion, this tells us that roughly 3% of the world's population is in universities $((235 \text{ million} / 7.8 \text{ billion}) \times 100)$. Now let's consider online education for the two most popular online learning platforms - Coursera and edX. In 2021, Coursera reported 92 million registered users, and edX reported 110 million in 2020. This is a total of roughly 200 million learners, or roughly 2.5% $((200 \text{ million} / 7.8 \text{ billion}) \times 100)$ of the global population. Though on a global scale, this seems like a small fraction, it is nonetheless an 83% $((2.5 / 3) \times 100)$ increase in learners interested in pursuing further education but for whatever reason were not able to do so with a traditional education model. What's more, this does not account for other online learning platforms like Udacity, Udemy, Skillshare, or even YouTube.

To summarize, online education and MOOCs are not perfect. There are many issues plaguing the current online education sector, such as high dropout rates (Clow, 2013), poor study

material quality (Atiaja & Proenza, 2016), academic integrity issues (Grey, 2022), and even though it's still more affordable than traditional on-site education, high cost. It also requires considerable investment from educational institutions in the form of IT infrastructure and teaching staff (Joyner & Isbell, 2021). All these are important issues that need to be addressed if we want to provide people with high-quality and accessible education. That being said, none of these issues have anything to do with half of the world's population not having access to education. If we truly want to make education accessible to everyone, then we have to start by figuring out how to democratize internet access and build necessary IT infrastructure in regions where it is not yet available. This is an extremely difficult problem to solve that will require the involvement of governments, policymakers, corporations, and extremely good ideas - ideas that perhaps might surface during an online lecture.

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2. Statista (2021). *Share of households with a computer at home worldwide from 2005 to 2019*. Retrieved from <https://www.statista.com/statistics/748551/worldwide-households-with-computer/>
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