Impact of Collaborative Game Design Projects on Student Engagement and Problem-Solving Skills: An Action Research Plan

Mattheiu Brooks

EDLD 5315

Lamar University

Impact of Collaborative Game Design Projects on Student Engagement and Problem-Solving Skills: An Action Research Plan

The use of games in education is seen as a viable way to boost student involvement and the results of learning. In my instructional setup, I see the potential, especially in using game development as the context for collaborative work, to inform students' understandings of the game development process. The research question guiding my investigation asks how these collaborative projects (and the experience of working together to develop games) positively affect student involvement and problem-solving abilities.

This study seeks to integrate these projects into the curriculum to allow for an interactive and hands-on learning environment that permits students to collaborate and think critically. No previous research has been done on this kind of project, so it's a relatively new innovation. It is said that this kind of project directly addresses the needs for more innovative teaching methods in video game design while emphasizing the benefits of game-based learning, which this study references (Dichev & Dicheva, 2017).

Fundamental Research Question

How does having players work together on interactive games make them more interested in what's happening in class? And when they're designing games together, in teams, does that sharpen their problem-solving chops?

Why is this research question important? It addresses two critical elements in the design of game design education: student engagement and their problem-solving skills. With the game design field evolving at a quick pace, teaching methods must follow, not only to keep students interested

but also to equip them with the necessary skills for industry success. Working on collaborative projects simulates a real-world game development situation, which hopefully both student motivation and their faculties for problem-solving will benefit from. Exploring this question will therefore yield valuable insights. (Yildirim, 2017)

Summary of the Literature Review

The literature review zeroes in on the application of gamified learning in education, particularly in higher education. The application of game-based learning has seen increasing day-to-day relevance and serves as an inspirational vehicle for injecting new and fresh ideas of accomplishing ways to reinforce and challenge the young mind to elicit learning. The reward structures—when applied appropriately to the intended design of the game—stimulate the desired learning outcomes.

From the literature, key findings include: First and foremost, there actually seems to be evidence of something akin to increased student motivation and engagement. A number of studies have been conducted within a range of disciplines at higher education institutions, and the results have mostly been of a positive nature. Basically, when universities incorporate game elements into learning scenarios, students seem more motivated by what they are doing if those scenarios are compared to more non-gamified learning environments.

1. Better achievement in school: The work of Ortiz-Rojas and others (2020) shows that game-based learning can push student performance to the next level, enhancing their grades and the rates at which they pass their subjects. This applies to knowledge retention too.

2. Upgraded thinking and resolving issues: The research of Chans and Castro (2021) demonstrates that students can be trained to think critically and solve problems. Game-based learning serves this purpose better than any other method.

3. Difficulties in carrying out: Although it is promising, game-based learning carries certain difficulties in implementation, such as the necessity of a technological setup, adequate teacher training, and the possibility of a backfiring competition. Our literature review has built a powerful base for the project and has nicely underscored the potential that collaborative design has to do what private industry has done for many years—that is, to produce a powerful educational resource (see, e.g., Tobias & Fletcher, 2011)—while also pointing to certain problematic areas likely to arise during implementation.

Study Information

Research Design

Combining quantitative and qualitative methods is the right way to go because it provides a detailed and in-depth assessment of the effects of using collaborative game design projects on student participation and engagement. Successful studies in this domain use a blend of both methods to gather data and determine results (Borrego et al. 2014). The authors state they will follow in the steps of these studies by first using the quantitative method to survey the participants, asking a variety of questions whose answers can then be easily compared and analyzed together to yield a certain result, and using the same metric to measure student performance in problem-solving.

Collaborative projects can be evaluated for their measurable impact on students, much like Yildirim (2017) did with game-based learning. Yildirim noted on several occasions in his research that the effect reaped by game-based learning (the cause) was like a "metric" of sorts and saw no need to elaborate. The project team that looks at projects and their products will similarly see whether the "metric" of success is reached—that is, whether the collaborative projects undertaken by students result in expanded knowledge and skills.

A deeper look at student experiences and perceptions of group projects will yield more profound knowledge and understanding. That is what a study by Chans and Castro (2021) found.

You see, they, too, wanted to really know what happens in collaborative game design projects—what students are doing, what they're thinking, how the projects are affecting their skills and overall learning. So they used our wonderful tool of interviews to go beyond the surface of the data.

Increasing the precision of research results has been, and will continue to be, the goal in most branches of science.

Data Collection and Analysis

During the collaborative implementation at each stage, data will be collected regularly throughout the semester. We will use several collection methods, but mostly surveys, to gather quantitative (and some qualitative) data on student engagement and perceptions of delicate problem-solving. For the most part, surveys will be administered at the start and end of a project.

And like any good survey, they will use a scale of some sort. Our survey scale will come from the well-tried and trusty "Likert Scale."

Interviews and focus groups conducted midway through and at the end of the semester will give us essential qualitative information from students about their experiences and achievements with these team projects. ... These two project phases, along with straight-up problem-solving creativity and teamwork, will be assessed against predetermined rubrics (provided in advance) that reflect the expected quality and variety of student work as well as direct application of problem-solving skills (and problem-solving failures, too) to the design of multimedia games across a series of courses within the curriculum.

Regular observations of classrooms will be done to record how students interact and take part in project activities. Data will be collected from classes under observation on things that might affect their overall performance on this project, such as initial attendance (do the students come to class?) and completion of important project milestones, as well as grades.

Timeline for data collection:

In Week 1, pre-project surveys will be administered, and initial observations will be made. This will be followed, in Week 5, with mid-semester interviews and focus groups and, in Week 10, with mid-project surveys and additional initial observations, enabling a direct comparison with the pre-project observations.

At the end of the semester, Week 15 will see more interviews and focus groups, this time bringing the project to a close. Finally, Week 16 will see post-project surveys administered and

final observations made. Once again, this will furnish a next-step comparison to how the project played out in real-time, based on all the metrics and methodologies used along the way.

Sharing and Communicating Results

I will share the results of my action research study with several key stakeholders. Here, I list three categories of recipients: Game Design Faculty: My findings will be shared in a comprehensive report and presentation with my fellow faculty members. This will allow us to discuss the strategies that I have used, in an effort, quite frankly, to survive, and to use those strategies as a basis for other courses to replicate some of my successes.

Department of Education Technology: The data will likely be shared with the Department of Education Technology, providing a summary for them that will point toward possibilities for the collaborative projects to better student outcomes.

Game design students both now and in the future can expect to receive a simplified yet comprehensive version of what this research has uncovered, laying out for them the importance of collaboration within their often solitary, secretive field of art. Collaborative projects force game design students to practice communication skills that will be essential to their careers.

Relevant conferences will be targeted for submission of the research results, such as the GDC Education Summit.

We plan to get the word out through scholarly publications. Articles will describe in fine detail the research methods, the kinds of data we obtain, and what we believe the data tell us. We aim to write for journals that serve our scholarly community and get our work taken seriously by experts in the field.

I selected these principal stakeholders—both potential beneficiaries as well as potential implementers—upon the initial conception of this project. I count among the first group, Game Design students and faculty here at George Mason University and in my department, with whom I have shared the findings to date and from whom the project still has much to benefit (I have one more semester of research left). They have been and remain my most intimate audience, and the second.

Final Reflection

When I've finished the study, I plan to take some time for a real, in-depth reflection. I'll use that time not only to form a good sense of how effective the research was in the end but also to identify room for improvement. I'll consider these aspects:

Investigative Methodology: I will evaluate the benefits and drawbacks of the methods we use to assemble information. This will have immediate value by informing our current project but will be doubly useful for guiding subsequent projects. Whatever we learn from the current project about collection methods can enhance future efforts. We are also aware, of course, of some of the critiques that are usually leveled at GBL research.

Outreach projects between faculty members and other on-campus departments or external entities are not yet a common practice in business schools, even in business programs that aspire to be characterized by their research. Outreach remains an add-on that is undertaken by a small number of committed faculty members who must stretch their time to meet both research and service requirements.

I plan to assess the impact that the use of collaborative projects has had on my teaching. I'll look at how my methods have changed and also at what may be emerging as best practices. Of course, I don't expect those benefits to end with my own classroom but to have ripple effects. My students and I shouldn't be the only ones who profit from this experience, as I intend for the work that we do to provide value for other teachers and to inform their practice.

I will review any problems I faced with the research for this project, such as issues with the technological tools I used or how working in a competitive environment influenced me, and then say whether the solutions I came up with resolved the problems.

Potential Areas for Future Research or Curriculum: In the next section, I will use my experience and research findings as a basis to outline possible areas for future work in game design education. The potential for games to teach and their effectiveness as tools for learning has only begun to be explored. Because of the still largely untapped potential, there are many issues that we could address. I will focus on a few specific areas that seem to present the most promise for the field in the near future.

Individual Development: I will think deeply about my learning and development as an educator and researcher during this action research initiative and communicate the value of continuous professional development in the implementation of innovative teaching strategies.

I will put my comprehensive thoughts into a report, and this report will then be shared with my counselor for feedback. Naturally, as with anything I do in my discipline, the first thing I get out of this experience is the learning I do through the act of doing it. And what then follows is how I take my initial learning and apply it to something else.

References

Borrego, C., Fernández, C., Blanes, I., & Robles, S. (2017). Room escape at class: Escape games activities to facilitate the motivation and learning in computer science. Journal of Technology and Science Education, 7(2), 162-171. https://doi.org/10.3926/jotse.247

Chans, G., & Castro, M. (2021). Gamification as a strategy to increase motivation and engagement in higher education chemistry students. Computers, 10(10), 132. https://doi.org/10.3390/computers10100132

Dichev, C., & Dicheva, D. (2017). Gamifying education: What is known, what is believed and what remains uncertain: A critical review. International Journal of Educational Technology in Higher Education, 14(1), 1-36. https://doi.org/10.1186/s41239-017-0042-5

Hanus, M. D., & Fox, J. (2015). Assessing the effects of gamification in the classroom: A longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance. Computers & Education, 80, 152-161. https://doi.org/10.1016/j.compedu.2014.08.019

Tan, M., & Hew, K. F. (2016). Incorporating meaningful gamification in a blended learning research methods class: Examining student learning, engagement, and affective

outcomes. Australasian Journal of Educational Technology, 32(5), 19-34. https://doi.org/10.14742/ajet.2232

Wiggins, B. E. (2016). An overview and study on the use of games, simulations, and gamification in higher education. International Journal of Game-Based Learning, 6(1), 18-29. https://doi.org/10.4018/IJGBL.2016010102

Yildirim, I. (2017). The effects of gamification-based teaching practices on student achievement and students' attitudes toward lessons. The Internet and Higher Education, 33, 86-92. https://doi.org/10.1016/j.iheduc.2017.02.002