2-2018

When Students Design Their Own Games: A Failed Experiment In a First-Year Seminar

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Presented at the
APSA Teaching and Learning Conference
Baltimore, MD, February 2-4, 2018

Abstract

This paper compares indicators of student engagement across different sections of a first-year seminar taught in Fall 2017. As part of an active learning pedagogy, students in the author's sections of the course were clustered into teams that designed and played games on refugee migration, aid, and resettlement. Students in seminar sections taught by other faculty members experienced traditional forms of instruction that did not include game design. Data from a survey administered to students in different seminar sections did not indicate an association between game design and student engagement. Further investigation revealed substantial declines in the results of student evaluations of the author's teaching from the previous year, despite only minor differences in course content. Colleagues anecdotally reported a marked decrease in the academic orientation and performance of first-year students in 2017, suggesting that pre-existing characteristics may be a greater influence on student engagement than an active learning pedagogy involving games.

The Active Learning Pedagogy

Games and simulations exemplify an active learning instructional methodology. The rationale for their use as teaching tools starts with the premise that they actively engage students in the direct experience of a lived reality, an environment that allows for efficient comprehension of complex knowledge and development of skills. This environment is believed to facilitate learning because it permits rapid and continuous empirical observation, hypothesis formulation, and hypothesis testing (Enterline and Jepsen 2009, 58). Traditional pedagogies, in contrast, require that students passively receive information from teachers, work to understand it, and then, after some delay, attempt to correctly apply it. When a delay exists between encountering knowledge and the opportunity to apply it, it is believed to become less relevant to the learner, resulting in decreased interest and less learning (Dorn 1989, 6).

Although active learning seems to have several advantages over traditional teaching methods, its effectiveness is not as clear as is generally assumed. Andrews et al. (2011, 394) found "no association between student learning gains and the use of active-learning instruction" in college biology courses. Meta-analyses of problem-based learning, an active learning methodology frequently used in medical education, found no evidence that it contributed to superior performance on standardized exams (Gijbels et al. 2005, 31-32). In an introductory statistics course, students who experienced the active learning method of a flipped classroom were less satisfied with how the technique "oriented them to the learning tasks in the course" (Strayer 2012, 171). Cobb (2016, 13) found no difference in student performance across traditional, flipped, and online versions of an American government course. In a review of literature on the use of active learning techniques in the political science classroom, Ishiyama (2013, 124) found "remarkably little empirical evidence . . . in the top SOTL journals in US political science and international relations that demonstrates such techniques are effective in promoting student learning."

Teaching With Gaming and Simulation

Reported benefits of games and simulations include improvements in students' domain knowledge, analytical thinking skills, and exam scores (Shellman and Turan 2006, 30; Frederking 2005, 391; Baranowski 2006, 40); their intellectual and emotional engagement (Weidenfeld and Fernandez 2017, 54; Crocco, Offenholley, and Hernandez 2016, 418); their desire to learn about the practices and beliefs of different ethno-cultural groups (Sales et al. 2013, 3); and their empathy toward others (Cruz and Patterson 2005, 43; Chen et al. 2015, 3; Zappile, Beers, and Raymond 2017, 11). A study by Crocco et al. (2016, 419) found that games were "most effective when used to foster higher-order thinking, such as application, analysis, and evaluation." In a meta-analysis of published literature, Baranowski and Weir (2015, 399) concluded that "a small but growing body of evidence lends support to the contention that students who participate in simulations do in fact learn more than students not taking part in such exercises."

However, other studies have not replicated these findings. Raymond (2010, 57) found that no statistically significant improvements in exam scores among students who participated in a simulation, while Powner and Allendoerfer (2008, 85) concluded that there were no statistically significant differences in the overall performance of students who participated in either a role-play activity or classroom discussion.

I became interested in whether the design of games by students, in contrast to only gameplay, might have a positive effect on students' engagement with a course's academic content. A review of the literature produced only one journal article on the subject, "What Happens When Students Design and Run Their Own Simulations?" by Ken Jones, published in 1998 in *Simulation & Gaming*. In the article, Jones presents a classroom exercise in which groups of students designed simulations by answering four questions:

> "What's the problem (or issue, or situation)? Who are the participants (roles, duties)? What do they have to do (talk, plan, negotiate)? What do they have to do it with (previous knowledge, documents, match-sticks)?" (Jones 1998, 393).

Jones focuses the exercise's ability to "confer power to the participants" and "encourage teachers to share power and responsibility" (Jones 1998, 342). He does not discuss the activity's usefulness in achieving specific cognitive or affective outcomes.

The Course

I decided to test my hypothesis that game design might improve student engagement in UNV 101 University Seminar I, a three-credit course taken in the first college semester by all entering undergraduates at my university. Launched in Fall 2014 as a part of a revision to the university's general education requirements, its stated purpose to provide students with an opportunity to "begin to develop college-level analytical and communication skills to prepare them for academic success" (Salve Regina University 2017). Specific course content is left up to the instructor. I have taught UNV 101 since its inception and emphasize three of the student learning outcomes in the university's general education curriculum (Salve Regina University Core Curriculum Task Force 2013):

- Speak and write about significant issues in a cogent, analytical and persuasive manner.
- Analyze and evaluate the interaction among diverse populations around the world and within the United States.
- Demonstrate awareness of the challenges facing society and of the need for merciful and just responses to them.

This last learning outcome provided me with a justification for building a critical, social justice-oriented agenda into UNV 101 in 2016. The study of refugees and immigration—a topic made all the more relevant by the outcome of that year's U.S. presidential election—acting as a framework for this agenda. My intent was not to organize the course around the traditional assessment of students' recall of factual or conceptual knowledge, but to "inspire the adoption of new frames for understanding and, possibly, changing the world" (Barab et al. 2007, 266). My hope

was to introduce students to alternative modes of thinking about people who are frequently disparaged and mistreated.

Multi-week, collaborative game design projects served as an instrument for implementing this agenda in 2016 and 2017. These projects involved students in design thinking, an iterative, feedback-driven process of problem definition, understanding the complexity and uncertainty of systems, decision making, and teamwork. Design thinking, when embedded in a project-based learning environment, emphasizes the application of knowledge as a means of making the problem at hand understandable (Dym et al. 2005, 104-105; Gaydos 2015, 478). Games happen to represent aspects of design thinking in a manner that is easy for students to comprehend. For example, any game reflects a set of deliberate choices made by the designer that were intended to benefit the game's end users. Games also illustrates the principle that the suitability of a solution often depends on the context of the problem. "[A] game that succeeds in one environment may not succeed in another" (Crocco et al. 2016, 407).

During the semester, students in my UNV 101 section participated in three game design projects. Each project included a preparatory memo-writing assignment to familiarize students with the game's real-world context, a game design and construction phase, play-testing of the completed game by another team of students who scored it against a rubric of design criteria, and a performance evaluation in which students ranked the contributions to the project of all team members. The memo, rubric score, and performance evaluation all contributed to students' final course grades.

For each project, I provided students with a problem definition of the game they were about to design, specifying the role assumed by the game's players, the game's setting, and its educational objectives. The problem definition for the first game, which placed players in the role of a young South Sudanese woman who flees her village and becomes a refugee, is contained in Appendix A. In the second game, players acted as members of a humanitarian aid organization that constructed

and operated a camp for Rohingya refugees in Thailand. For the third game, players decided how a community in the U.S. could best assimilate a group of resettled refugees from Afghanistan. Collectively the three projects represented approximately twenty-five percent of the final course grade.

In Fall 2017, students also completed twenty-three written responses to readings, worth fifty-seven percent of the final course grade. Another portion of the course grade came from a reflective writing assignment that included the question "What helped or hindered your learning about the problem solving process when reading, writing, and designing games?" This assignment served as a meta-cognitive debriefing at the end of the semester. Students also completed a final essay exam that asked them to compare, using game design principles, a game that they had helped design with a game that they had played that had been built by another team. In sum, the course contained twenty-nine graded writing assignments completed outside of class. During class, students discussed reading responses, participated in exercises to practice their argumentative writing skills, and gave team presentations when they were not engaged in game design. I occasionally presented information related to different aspects of human migration, but I did not give formal lectures.

Data Collection and Analysis

Data on student engagement was collected through an anonymous online survey of students in UNV 101. Of the twenty-two UNV 101 instructors contacted about the research project, nine supplied the survey to their students. One of these nine taught an honors program section of UNV 101; since no other faculty members teaching honors sections of the course participated in the collection of survey data, these responses were discarded. A review of syllabi confirmed that students in UNV 101 sections taught by these other instructors participated in a game design project.

Survey questions, shown in Table 1 below, were scored on a four-point scale with possible responses of "often," "sometimes," "rarely," and "never." Responses were analyzed using a two-tailed *t*-test.

		Average Score		
Q		Me	Other	*p*
1	I came to class in UNV 101 without completing readings or assignments.*	1.35	2.12	0.0017
2	I talked with students outside of class about topics from UNV 101.	2.29	2.94	0.0026
3	I wrote about readings that were assigned in UNV 101.	3.47	3.35	0.7027
4	I worked with other students in UNV 101 on projects or assignments.	3.29	2.77	0.0000
5	UNV 101 helped me develop a better understanding of people who are different from myself.	2.88	2.85	0.5624
6	UNV 101 helped me become a more effective communicator.	2.53	2.91	0.0009
7	UNV 101 increased my willingness to eat breakfast, lunch, or dinner with students whose backgrounds are different from my own.	1.94	2.30	0.2805
8	I read, wrote, or talked about unfamiliar perspectives or ways of thinking because of UNV 101.	2.59	2.83	0.0487
9	In UNV 101 I practiced designing solutions to complex problems that exist in the world.	2.76	2.49	0.4025
10	UNV 101 made me more confident about ignoring the opinions of people with whom I disagree.*	2.18	2.54	0.1009

*negatively-worded question

Table 1: UNV 101 Survey Responses

Statistical significance at the level of $p < 0.05$ was present for responses to Q1, Q2, Q4, Q6, and Q8. Students in my UNV 101 sections reported a significantly higher frequency of coming to class having already completed assigned readings and of collaborating with classmates on projects.

Discussion

Survey data did not reveal a positive association between game design and student engagement. Although differences in average scores for Q1 and Q4 were statistically significant, this can be attributed to the high number of reading-based writing assignments and the large amount of classroom time devoted to project collaboration in my UNV 101 sections. According to syllabi, other sections of UNV 101 did not have a similar number of these assignments or substantial amounts of student collaboration.

The statistically-significant differences for Q2, Q6, and Q8 suggested a negative association between game design and student engagement, so I looked for possible alternative explanations. I examined student evaluation of teaching results for my UNV 101 course in 2016 and 2017. These results—on a five-point scale—are shown in Appendix B. Scores for my UNV 101 sections declined precipitously from 2016 to 2017, despite only minor differences in course content. Generally scores fell from being at or above the average for all UNV 101 sections in 2016 to far below the average in 2017. For some evaluation items, scores for my 2017 UNV 101 section were up to fifty percent lower than scores for my 2016 section. It appears that students were far more satisfied with my teaching of UNV 101 in 2016 than they were in 2017, a factor that could have affected their responses to the survey on student engagement. The final course grades earned by students in my UNV 101 course were also substantially lower in 2017 than in 2016.

Conclusions

Instructors adopt active learning methods like games and simulations to enhance student learning, increase student engagement, and challenge student attitudes (Baranowski and Weir 2015, 393). Yet these methods, if they are to function effectively, require that students be motivated to exercise leadership over their own learning (Asal et al. 2014, 348). Entering college students who expect a banking model education in which information is transmitted by an authority figure (Freire 1970) are likely to react negatively to expectations that they collaborate with peers to achieve cooperative outcomes or that they acquire an understanding of complex, unstructured problems with only minimal guidance from instructors. What these students really value is not learning, but "activities which achieve the desired grade" (Machemer and Crawford 2007, 26).

Anecdotally it appears that my experience teaching UNV 101 in Fall 2017 were not unusual. Colleagues who also taught the course reported that their students were less academically prepared, less motivated, and more behaviorally problematic than the students they had encountered in UNV 101 in prior years. Given the increasing proportion of students at my

university who receive financial aid, the decline in net tuition revenue per student, and the correlation between college preparedness and socioeconomic status, it appears that the university is buying the attendance of academically marginal students with greater amounts of financial aid. These are the very students who seem to be the most resistant to an active learning pedagogy.

Appendix A: Problem Definition

Game Design: South Sudan Migration

Task: Build a game about refugees.

Read:

- International Rescue Committee, "What's In My Bag?" *Medium.com*, 4 September 2015, https://medium.com/uprooted/what-s-in-my-bag-758d435f6e62#.pdlibnsdh.

Game player role: You are a 26-year old Nuer woman. You have two children, ages 4 and 7, and live in a village located at 9°52'39.0" N, 32° 53'50.9" E.

Game setting: Your surviving adult male relatives are fighting in a regional conflict involving Sudan and South Sudan. Armed militia units loyal to Sudan's central government have crossed the border into South Sudan. Within the next twenty-four to forty-eight hours, either this militia or forces loyal to one of the factions fighting in South Sudan's civil war will probably occupy your village. You decide that your only chance for survival is to flee.

Game objective: Successfully get to a camp in an area free of military conflict where international organizations are providing aid to refugees.

Questions to consider when designing the game:

- What should players learn from the game? How will the game function as a way to learn these concepts or skills?
- What will help or hinder a person who makes this journey?
- What can a person fleeing this part of Sudan expect to encounter? What might a person encounter that is unexpected?
- What is the best destination to flee to? Why?
- How can information from the policy memo and readings from the syllabus be incorporated into the game?

The game should reflect the design principles discussed in these articles, which will also be relevant to the final exam:

- http://activelearningps.com/2017/02/15/the-golden-rule-and-the-magic-circle/
- http://activelearningps.com/2017/02/22/cooperative-and-semi-cooperative-games/
- http://activelearningps.com/2017/03/01/written-and-unwritten-rules/
- http://activelearningps.com/2017/03/08/choice-points-outcomes-and-chance/
- http://activelearningps.com/2017/03/15/enjoyable-cores-aesthetics-and-narrative/
- https://www.polygon.com/2017/6/22/15730254/cia-board-game-volko-ruhnke-coin-series-gmt-games

Appendix B: Student Evaluation of Teaching Results for UNV 101 First-Year Seminar

	Fall 2016				Fall 2017			
	N out of 22	My Ave	Course Ave	Δ	N out of 43	My Ave	Course Ave	Δ
Goals clearly outlined	13	4.6	4.2	0.4	28	3.0	4.2	-1.2
Materials appropriate	13	4.3	4.2	0.1	28	3.0	4.2	-1.2
Challenging content	13	4.1	4.0	0.1	28	3.4	4.0	-0.6
Learned a great deal	13	4.2	4.0	0.2	28	2.2	4.0	-1.8
Independent thinker	13	4.3	4.1	0.2	28	2.3	4.1	-1.8
Build problem solving skills	13	4.4	3.8	0.6	27	2.2	3.7	-1.5
Build debate abilities	13	4.2	3.9	0.3	27	2.5	3.8	-1.3
Build writing skills	13	4.5	4.0	0.5	27	2.4	3.9	-1.5
Conducive to engagement	13	4.2	4.1	0.1	27	2.1	4.0	-1.9
Conducive to discussion	13	4.3	4.1	0.2	27	2.4	4.1	-1.7
Expanded awareness	13	4.5	4.1	0.4	27	2.7	4.1	-1.4
Intellectually challenging	13	4.2	4.1	0.1	26	2.4	4.0	-1.6
Instructor organized	13	4.3	4.1	0.2	28	3.2	4.2	-1.0
Teaching helped	13	4.0	4.1	-0.1	28	2.0	4.1	-2.1
Clear presentation	13	3.8	4.1	-0.3	28	2.3	4.1	-1.8
Enthusiasm for teaching	13	3.8	4.5	-0.7	28	3.3	4.5	-1.2
Instructor knowledgeable	13	4.1	4.5	-0.4	28	3.3	4.5	-1.2
Clear grading system	13	3.8	4.0	-0.2	28	2.3	4.0	-1.7
Timely/helpful feedback	13	3.9	4.1	-0.2	28	2.9	4.1	-1.2
Could freely express opinions	13	4.3	4.3	0.0	28	2.5	4.2	-1.7
Instructor available for help	13	4.3	4.3	0.0	28	2.5	4.2	-1.7

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