Better Game Studies Education the *Carcassonne* Way

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ABSTRACT
As game design programs become more common, educators are faced with challenges in bringing the formal study of games to students. In particular, educators must find ways to help students transition from viewing games purely as entertainment to a field worthy of critical study. One aspect of this transition is to view games on the level of mechanics rather than purely in terms of aesthetics.

The study described in this paper was conducted to test the hypothesis that exposing students in an introductory game studies class to German-style board games would lead to improved understanding of game mechanics. The data gathered shows that the students who were exposed to these types of games did exhibit a greater understanding of game mechanics at the end of the course.

Author Keywords
Game Education, Game Literacy

INTRODUCTION
One way to teach students about game mechanics would be to teach them more about board games. When playing a board game, the players themselves execute the mechanics, as opposed to digital games, where the execution of the mechanics is hidden from the players.

In particular, German-style board games are characterized as having simple rules and innovative mechanics [9]. We hypothesize that students exposed to this type of game may exhibit greater understanding of game mechanics than students who are not. We also predict they will apply this understanding to their study of computer games.

Students in introductory game design classes tend to view games in terms of genre or narrative, rather than mechanics. Prolific board game designer Knizia suggests that the view may be cultural. He says:

> *In America, the theme is seen as the game where as in the European the game mechanics and the game system are seen as the game. [4]*

Furthermore, the social nature of board gaming may foster a more reflective atmosphere for deeper understanding. Woods argues that players of board games develop a sense of shared responsibility to maintain the integrity of the game [10]. While in digital games, no such sense emerges since the machine maintains the integrity of the game and the player's experience is less social.

Figure 1: Students playing *Settlers of Catan.*

Accessing student's understanding of game mechanics is not straightforward. To do so we designed a survey with open-ended responses to a variety of game design questions. These responses were then categorized using qualitative data analysis techniques.

RELATED WORK

Game Education Studies
Various studies by Zagal have explored the relationship between students and game studies education. Many of these involved gathering qualitative data from participants and evaluating it using techniques similar to those used in this study. The two approaches that are most relevant are the Game Ontology and GameLog.

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The intent of the Game Ontology project is to provide a framework for describing, analyzing and studying games. It presents a hierarchy in wiki format of structural game elements, including mechanics, goals, and interfaces. For the study, students in introductory game studies classes were given an assignment to contribute examples of mechanics from games they were familiar with to the hierarchy. Following the class, a selection of students were interviewed about their experiences with the Game Ontology and how it affected their learning experience. Qualitative analysis was performed on these responses as well as a selection of the examples contributed by students [12].

In a related project, GameLog, students were given an assignment to keep a journal of their experiences while playing games for an introductory game studies class. As in the Game Ontology study, interviews were conducted with selected students, and both the responses and the student's entries were qualitatively analyzed [11].

Both of these studies shown that the activity contributed positively to the student's learning experience. In both studies, the interview responses were largely positive, and a significant number of students chose to make more contributions than they were assigned to do. These results suggest that students benefit from educational activities beyond normal lectures, reading, and assignments.

However, the analysis of the student's contributions in these studies found that many displayed a lack of critical thinking about games. In the Game Ontology study, only 60% were deemed of sufficient quality to remain in the Ontology, while the rest needed editing or were removed altogether. In the GameLog study, many entries were merely narratives of the student's experience playing the game without any insight or critical analysis.

Zagal also conducted a study that consisted of a series of interviews with game studies instructors. The purpose of this study was to assess what the greatest challenges in game education are. One of the challenges reported was that significant previous experience with games can be a hindrance to thinking critically about games. The students who were most experienced with games had difficulty transitioning from being fans to thinking about games critically [13].

Board Games and Mechanics in Game Education

Many game development books emphasize the role of non-digital games in the design process. Fullerton encourages students to create physical prototypes early in the design process in order to gain a deep understanding of their game mechanics. To avoid costly redesign during implementation, developers should iterate several times on their physical prototype before moving to the next stage of development [3].

Furthermore, Fullerton encourages designers to focus on the mechanics and underlying system of their games. Defining the player's goals and allowable actions makes it clear whether a game will be playable or not.

Brathwaite and Schreiber wrote a book for game designer that consisted largely of non-digital design challenges. They were designed to encourage critical thinking and inspire creative design. They encourage designers to focus on the core mechanics of their games and claim that the non-digital nature of the exercises will force them to [2].

A study by Ryan used non-digital games as a teaching tool in a game design class. In this study, students played several simple games, experimenting with different rule variations with an eye towards what was the most fun. The students were then given two different assignments, one focused on analysis and the other a design task. The students performed better on the analysis task, but the results of the design task were varied and inconclusive [8].

MDA Framework

The MDA framework was proposed by LeBlanc as a formal approach for understanding games [1]. Games are broken down into three layers: the mechanic, dynamic, and aesthetic components. Mechanics are the actual actions available to the player in the game system. Dynamics are the emergent properties of system and the player's interaction. Aesthetics are the surface-level elements of the game, including thematic and narrative elements as well as the player's emotional responses.

Academic writings on this framework suggest that the aesthetic level is the most visible to players [5]. Thinking about board games with respect to this framework suggests that the player's responsibility for the execution of the mechanics will result in a greater focus on the mechanics and dynamics layers.

STUDY DESIGN

This study was conducted with students in a large, general education introductory game design class. From the class we recruited a study group of volunteers to participate in a series of 1 hour seminars that met 8 times during the quarter. The students in the study group played and discussed several German-style games that were selected to represent a range of game mechanics and variations on those mechanics. All are considered gateway games, i.e., good introductions to the genre for novice players. These games are listed in Table 1.

Table 1: Games used in study

Name	Designer(s)	Mechanics
Bohnanza	Uwe Rosenberg	Set Collection, Negotiation
Carcassonne	Klaus-Jürgen Wrede	Tile Laying
Pillars of the Earth	Michael Rieneck, Stefan Stadler	Worker Placement

Puerto Rico	Andreas Seyfarth	Economic
Ra	Reiner Knizia	Auction
Settlers of Catan	Klaus Teuber	Set Collection, Economic
St. Petersburg	Bernd Brunnhofer	Card Drafting
Ticket to Ride	Alan R. Moon	Set Collection, Route Building
Transamerica	Franz-Benno Delonge	Route Building

To assess the student's change in understanding of game mechanics, we designed a survey consisting of several open-ended questions. Students in the class took the survey at the beginning and again at the end of the course. Taking the surveys was optional for the students, but a total of 68 took both surveys.

The survey questions are shown in Table 2.

Table 2: Survey questions

1. Describe a computer game of your choosing using 5 adjectives.
2. Describe the objective of the game you picked in one sentence.
3. Design a player aid for the game you picked. What information would a novice need to play the game?
4. Add a new mechanic to the game you picked. Describe the mechanic and how it would change the game.
5. Describe how you would create a board game version of a First Person Shooter [3].
6. Pick a game where the story is an important part of the playing of the game. Name the game and describe it without making reference to the story.

The open-ended text responses were analyzed using qualitative analysis techniques similar to those suggested by Mayring [7]. The inductive categories we selected were derived from the MDA framework. Responses were categorized as being either mechanics-, dynamics-, or aesthetics-centered, with an additional category for blank or irrelevant responses.

An example of a mechanics-centered response to the question "Describe the objective of the game you picked in one sentence" for Katamari Damacy would be:

> *mesh with almost everything by rolling around to get bigger to collect everything on yourself.*

An example of an aesthetic response for the game Fallout 3 would be:

> *Emerging from a protective vault after a nuclear war, the character must find his way in this new world, and ultimately try to find his father.*

Dynamics-centered responses are harder to characterize. Responses that were about gameplay, but did not refer to specific mechanics were generally placed in this category. An example from the game Left 4 Dead is:

> *Survive zombie attack while traveling to the nearest designated safe house destination.*

The responses were categorized by a primary and secondary coders working independently. The secondary coder only categorized a random subset of the data to establish a confidence for the primary categorization. The two codings were found to be in agreement 73% of the time. This is well above the 60% agreement that Landis suggests is substantial [6].

DATA ANALYSIS

The study group wound up being much smaller than we had hoped for. Of about 20 volunteers, many dropped out immediately, and only 5 attended 4 or more sessions. The self-selection of the study group had a greater effect on the survey than anticipated; all 5 professed interest in pursuing a degree in Computer Game Design, and the study group exhibited a higher understanding of game mechanics on the initial survey.

The qualitative measure we use to access understanding of game mechanics is the percentage of survey questions that were answered with a mechanics-centered response. Comparing the average for the study group with the overall average for the class (see table 3), we see that the study group not only starts higher, but also shows a larger change by the end of the class. However, given the small size of the study group, it is unclear if this is a significant result.

Table 3: Percentage of mechanics-centered responses

	Study Group	**Class Average**
Initial Survey	40.0%	30.6%
Final Survey	43.3%	31.1%
Change	3.3%	0.5%

Looking at the data from the opposite perspective, we can argue that a decrease in aesthetics-centered responses might indicate a departure from surface level thinking. Both groups showed a decrease in these types of responses, though the class average showed a larger decrease, though as with the mechanics-centered responses, the small size of the study group may be misleading. These results are shown in table 4.

Table 4: Percentage of aesthetics-centered responses

	Study Group	Class Average
Initial Survey	20.0%	25.8%
Final Survey	13.3%	17.4%
Change	-6.7%	-8.4%

To further evaluate the effectiveness of this study we will now look at responses to individual questions to see what trends emerge in the 2 groups. Both quantitative data (percentage of responses in categories) and qualitative (specific types of answers within those categories) will be evaluated.

Question 1

"Describe a computer game of your choosing using 5 adjectives."

For this question, both groups showed an increase in mechanics-centered responses and a decrease in aesthetics-centered responses.

Table 5: Percentage change in response categories, Question 1

		Study Group	Class Average
Mechanics	**Initial**	0.0%	2.7%
	Final	20.0%	9.1%
	Change	20.0%	6.4%
Dynamics	**Initial**	20.0%	21.2%
	Final	80.0%	39.4%
	Change	60.0%	18.2%
Aesthetics	**Initial**	80.0%	70.5%
	Final	0.0%	33.3%
	Change	-80.0%	-37.2%

In the initial survey, responses to this question often focused on theme or genre, such as the following:

> *Hard Fun Fast Stylish Gothic*
>
> *Fun Innovative Story-Intensive Well Designed Challenging*
>
> *Sneaky Awesome Japanese Kojima Metal*

Responses in the final survey tended to be more descriptive of gameplay, though students had had more difficulty finding adjectives to convey their ideas:

> *colorful turn-based dice-based treats social*
>
> *level up close oblivion gates become guild leaders become wealthy complete quests*

Noteworthy in both the study group and the class average is a large increase in dynamics-centered responses. Given the difficulty in finding mechanics-centered adjectives, students were still more inclined to avoid giving aesthetics-centered responses at the end of the class.

Question 2

"Describe the objective of the game you picked in one sentence."

The class average showed an increase while the results for the study group were ambiguous. The class average increased in terms of mechanics-centered responses while decreasing in both other categories.

Table 6: Percentage change in response categories, Question 2

		Study Group	Class Average
Mechanics	**Initial**	20.0%	10.3%
	Final	0.0%	13.6%
	Change	-20.0%	3.4%
Dynamics	**Initial**	40.0%	48.6%
	Final	40.0%	-7.7%
	Change	0.0%	18.2%
Aesthetics	**Initial**	40.0%	35.6%
	Final	60.0%	27.3%
	Change	20.0%	-8.3%

This shift towards mechanics-centered responses suggests that the class overall was thinking about game objectives more in terms of what actions the player actually had to take to achieve their goals. In the initial survey, many responses described narrative objectives. For example:

> *To find your father and save or destroy the Capital Wasteland of Washington DC.*
>
> *Save the presidents daughter and return her to America.*
>
> *Become the Guy*

However, by the final survey, students were describing objectives more clearly in terms of mechanics:

> *Solve puzzles using portal mechanics.*
>
> *Destroy all the red balls in a gravity pinball type game.*

Each round of the game try to get as many coins and stars as possible while making sure other people don't get them via minigames and items.

Within the survey group, the opposite appears to be true. Given the small size of the group, the 20% swing means one student changed their response from mechanics-centered to aesthetics-centered.

Question 3

"Design a player aid for the game you picked. What information would a novice need to play the game?"

Many students struggled with this question – on average 16.5% of the responses were considered blank or irrelevant across the 2 surveys. Students struggled with the concept of a player aid, something more common in board games than digital games. As a result, their suggestions tended to be narrative hints than use of mechanics

Table 7: Percentage change in response categories, Question 3

		Study Group	Class Average
Mechanics	**Initial**	60.0%	54.8%
	Final	80.0%	47.0%
	Change	20.0%	-7.8%
Dynamics	**Initial**	40.0%	26.7%
	Final	20.0%	22.7%
	Change	-20.0%	-4.0%
Aesthetics	**Initial**	0.0%	0.0%
	Final	0.0%	4.5%
	Change	0.0%	4.5%

The study group, on the other hand, had no aesthetic-centered responses in either survey, and trended more towards mechanics-centered responses in the final survey.

Question 4

"Add a new mechanic to the game you picked. Describe the mechanic and how it would change the game."

This question also had a high number of blank or irrelevant entries – 21.6% on average. Among the students who did respond, many were unclear on what constitutes a mechanic. Some examples:

3-D Graphics. it would make the game much more visual.

being able to make the scene of the game as night time or day time with a special code.

I don't know what a mechanic is.

The final survey shows a similar trend for the class average as for the previous question – students were more inclined to try to give a response, but tended to give narrative-based examples.

The study group again demonstrated that they were starting at a different level than the class average. They had no aesthetic-centered responses on the initial survey and shifted more towards mechanics-centered responses in the final.

Table 8: Percentage change in response categories, Question 4

		Study Group	Class Average
Mechanics	**Initial**	60.0%	42.5%
	Final	20.0%	37.9%
	Change	-40.0%	-4.6%
Dynamics	**Initial**	40.0%	37.7%
	Final	80.0%	24.2%
	Change	40.0%	-13.4%
Aesthetics	**Initial**	0.0%	5.5%
	Final	0.0%	9.1%
	Change	0.0%	3.6%

Question 5

"Describe how you would create a board game version of a First Person Shooter."

Among all the questions, this one had the highest percentage of blank or irrelevant responses across the 2 surveys – 26.7% on average. This suggest that this exercise, borrowed from Fullerton's *Game Design Workshop*, is simply to abstract for students in a general education game design class. Some examples include:

I have no idea how to do that.

Not really sure if that is possible

A first person shooter is played in the eyes of an in game character. I wouldn't know how a board game could immitate(sic) that.

Responses of this nature suggest that students were not capable of abstracting from an action-based digital game to a board game. They could not identify the basic mechanics of moving and shooting, nor could they explain how they could be represented in a different medium.

Table 9: Percentage change in response categories, Question 5

		Study Group	Class Average
Mechanics	**Initial**	80.0%	58.2%
	Final	80.0%	45.5%
	Change	0.0%	-12.8%
Dynamics	**Initial**	80.0%	12.3%
	Final	80.0%	3.0%
	Change	0.0%	-9.3%
Aesthetics	**Initial**	0.0%	4.1%
	Final	0.0%	12.1%
	Change	0.0%	8.0%

The study group, on the other hand, gave consistent responses to question 5 across both surveys. All but one of the participants gave a mechanics-centered response in both instances.

Question 6

"Pick a game where the story is an important part of the playing of the game. Name the game and describe it without making reference to the story."

This question may have been unclear or poorly worded, as on the initial survey, many students gave narrative based responses despite being asked for a non-narrative response. Respondents on the final survey seemed to understand the question better. The class average showed a significant increase in mechanics-centered responses and corresponding drop in aesthetics-centered responses.

Though there was improvement in the final survey, this question still had a high percentage of blank or irrelevant responses, 26.1% on average. The study group, on the other hand, trended towards more mechanics-centered responses.

Table 10: Percentage change in response categories, Question 6

		Study Group	Class Average
Mechanics	**Initial**	20.0%	15.1%
	Final	60.0%	33.3%
	Change	40.0%	18.3%
Dynamics	**Initial**	80.0%	25.3%
	Final	20.0%	12.1%
	Change	-60.0%	-13.2%
Aesthetics	**Initial**	0.0%	39.0%
	Final	20.0%	18.2%
	Change	20.0%	-20.9%

CONCLUSIONS

We have described a study to show the effects of familiarity with German-style board games on students in an introductory game design class. Our data showed that there was a difference in understanding of game mechanics between the study group and the class average, but this result is far from conclusive.

It was clear from the data that the study group started out with a better understanding of game mechanics. All of the volunteers are regular players of digital games and plan to major in Computer Game Design. This self-selection makes it difficult to draw any firm conclusions. Even on the initial survey, the participants were more inclined to give mechanics-centered responses.

Despite starting out with a greater understanding, the study group participants felt that it was a positive experience that enhanced their education. Responses to a short questionnaire about the survey were generally positive. One student said:

> *I definitely feel I have a better grasp on how to design games. When you play video games it's easy to get so immersed in the experience you don't quite catch all the reasons that make the game so entertaining. … When I played the board games, I got the chance to actually think of how each game worked.*

The question of what effect board game familiarity could have on game education is still a valuable one. Given the difficulty the non-study participants had with some of the survey questions, there is clearly room for improvement in game studies education.

Any future study in this are should be designed to minimize or eliminate self-selection effects. For example, two separate classes could be compared, one taught with a strong non-digital game component and the other taught more traditionally, with a stronger digital game focus.

Regardless of the results, we encourage game educators to include more hands-on experience with non-digital games in their courses. Exposure to a wide variety of different gaming styles can only strengthen game studies education. Much as universities require a breadth of general education courses, game studies programs should teach familiarity with a diverse multitude of games, past and present, simple and complex, digital and not.

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