Jiang, B. et al. (Eds.) (2025). Proceedings of the 33rd International Conference on Computers in Education. Asia-Pacific Society for Computers in Education

Impact of Digital Learning Game Narratives on Affective Experiences and Learning

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Abstract: Digital learning games can support learning by improving students' affective experiences; however, these experiences may depend on the game narrative, and there is some evidence that narrative preference may vary by gender. We developed two different narratives of the same digital learning game focused on decimal number operations and compared them to a non-game control with the same math content. Although one game was designed to appeal to more masculine preferences based on a student preference survey, results indicated that students' learning, engagement, and interest in the games did not vary by narratives or by gender. Students reported greater engagement with the games compared to the non-game, and girls learned more than boys across all three learning conditions. However, the more casual game narrative reduced students' test anxiety and increased their test self-efficacy compared to the non-game, while the battle-oriented narrative did not. Given that girls generally reported lower levels of test self-efficacy and higher test anxiety, these results suggest that digital learning games–particularly those with a more casual game narrative–may be especially effective for girls who experience test anxiety in math.

Keywords: Digital learning games, gender, engagement, self-efficacy, anxiety

1. Introduction

As technology-supported instruction becomes more integrated into students' lives, it is important to understand how different design choices affect students' learning and affective experiences. Digital learning games are one area in which design choices may be especially important and under-studied. Digital learning games can provide instruction and practice with important concepts in an environment that may keep students playing, and thus learning, with more engagement and less anxiety than non-game instruction (Anastasiadis et al., 2018). However, there needs to be more systematic research assessing the effects of different game design choices on affective experiences and learning outcomes, and particularly how learners' identities and preferences might interact with game features to promote learning. In this paper, we present an experimental study designed to assess the interaction of game narrative and gender identity on students' affective experiences and learning outcomes with *Decimal Point*, a math digital learning game focused on decimal number operations, and *Ocean Adventure,* a new narrative version of the decimal number game.

There is a great deal of evidence that digital learning games can promote learning; however, researchers often rely on pre/post learning gains or poorly controlled comparisons to support claims that digital learning games promote better learning and positive affective experiences (Clark et al., 2016; Mayer, 2019; Hussein et al., 2022; McLaren & Nguyen, 2023). Consequently, observed differences in affective and learning outcomes might reflect effects of the game itself or other differences between conditions, such as the use of instructional technology (in a game vs. non-technology-based comparison) or the amount of practice and instruction (in a game vs. "business as usual" comparison). Fewer studies have adopted an experimentally rigorous approach comparing games to matched non-game controls (Hussein et al., 2022) or systematically varying features to assess impact (Mayer, 2019).

Decimal Point has been used to test game features in an experimental classroom setting for the past decade (McLaren, 2024). Controlled studies with *Decimal Point* have indicated that engagement is a significant factor in explaining why games support better learning than similar non-game learning systems. Richey et al. (2021) found that gaming the system—a measure of behavioral disengagement—mediated learning differences between *Decimal Point* and a non-game control with the same instructional content. In other words, the game reduced students' disengaged learning behaviors, which in turn led to greater learning. *Decimal Point* is a useful platform for studying learning and engagement with digital games, and it serves as an opportune context for investigating how different game design choices—in this case, narrative—influence students' affective experiences and learning.

Given engagement's role in learning from digital games (Richey et al., 2021), it is critical to explore how games can be as engaging as possible for a diverse audience of students. Students' game preferences vary widely across individuals (Nguyen et al., 2023; Moradi et al., 2024), and some evidence suggests these preferences vary systematically in relation to aspects of students' identities (Chen et al., 2010; Kim et al., 2021), including students' gender identity (Hawkins et al., 2019; Khan et al, 2017; Yeo et al., 2022). Students of all genders play and enjoy digital games; girls and boys report intending to play digital games at similar frequencies, but their preferred styles of games can vary by gender (Aleksić et al., 2017; Hamari & Keronen, 2017; Romrell, 2014). Similarly, research focused on digital learning games has found that they can promote learning, engagement, and self-efficacy among students of all genders (Sitzmann, 2011; Vogel et al., 2006). Some studies have found differences based on gender, with girls demonstrating greater learning or enjoyment (Khan et al., 2017; Tsai, 2017), while other studies have found no gender differences (Yen et al., 2011; Haruna et al., 2023).

In the case of *Decimal Point*, we have found consistent affective and learning benefits for girls compared to boys (Hou et al., 2020; Nguyen et al., 2022). We propose two possible explanations for this result. First, it is possible that girls find *Decimal Point*, which has an amusement park narrative, to be more engaging than boys do ("the engagement hypothesis"). Prior research has revealed some gender differences in game preferences, with boys tending to prioritize action, challenge, and visual appeal and girls tending to prioritize social interactions and puzzle-style features (Arroyo et al., 2013; Dele-Ajayi, 2018). Nguyen et al. (2023) found that boys and students with more masculine-typed traits reported preferring action, sports, and racing games, and girls and students with more feminine-typed traits said they preferred casual, music, and party games. The casual gameplay and friendly, collaboration-focused narrative of *Decimal Point* aligns more with the reported preferences of girls and students with feminine-typed traits. If girls are more engaged than boys with *Decimal Point* because they find the game design and narrative style more appealing, then changes to *Decimal Point* aimed at increasing its appeal for boys would minimize or eliminate the affective and learning advantages for girls.

Alternatively, it may be that learning math in the playful environment of a digital learning game minimizes the salient math cues of the content and, in turn, reduces math or test anxiety that might otherwise be triggered by math content ("the math anxiety hypothesis). Anxious thoughts consume working memory resources, increasing extraneous cognitive load and leaving fewer cognitive resources available for the mental work of problem solving and learning (e.g., managing the inherent complexity of solving math problems, storing new information in long-term memory, building connections between prior knowledge and new information; Beilock et al., 2010; Maloney et al., 2013; Sweller, 1994). If *Decimal Point*'s playful environment triggers less anxiety than traditional math instruction, it would free up more working memory space for learning about mathematical concepts. Girls tend to experience greater math and test anxiety in math domains and lower self-efficacy (Rocha & Dondio, 2021; Zhang et al., 2024), so minimizing math anxiety might be especially beneficial for girls. If this were the case, we would expect math digital learning games to benefit girls more than boys regardless of any gender differences in narrative appeal, and changes to make *Decimal Point* more appealing to boys should not change the affective and learning benefits for girls.

The current study aims to test these two hypotheses for why *Decimal Point* has led to better learning outcomes for girls—and to explore how game narrative might interact with

gender more generally in digital learning games—by investigating the impact of game narrative and gender on affective and learning outcomes. We created a novel version of the game, *Ocean Adventure*, with a narrative designed to appeal more to boys. We based the design on a game preference survey administered to 333 students (Nguyen et al., 2023); in *Ocean Adventure*, students play the role of a special agent battling pirates and criminals. Results showed *Decimal Point* was equally appealing to boys and girls, but the narrative description for *Ocean Adventure* was significantly more appealing to boys. By comparing two narrative versions of the game, *Decimal Point* and *Ocean Adventure*, we tested the following research questions:

RQ1: Do game narrative and gender interact to predict learning outcomes?

RQ2: Do game narrative and gender interact to predict affective experiences?

The engagement hypothesis predicts that girls benefit more from *Decimal Point* than boys because they find the game more engaging than boys do; therefore, narrative changes that appeal more to boys should reduce the affective and learning advantages for girls in *Ocean Adventure*. Conversely, the math anxiety hypothesis predicts that girls benefit more from *Decimal Point* than boys because they are more affected by math anxiety and low self-efficacy. It predicts that encountering math concepts in a playful game narrative reduces anxiety and potentially boosts self-efficacy compared to a non-game control. According to this hypothesis, the learning advantage for girls should not be changed by a narrative version that is more appealing to boys so long as the game still effectively reduces math saliency and thus anxiety. If boys experience greater affective and learning benefits from *Ocean Advent*ure than girls, it will support the engagement hypothesis. If girls' affective and learning benefits are similar across games, it will support the math anxiety hypothesis, particularly if anxiety is lower or self-efficacy is higher across narratives.

2. Method

Four hundred and eighty-one 5th and 6th grade students from six middle and elementary schools in a northeastern United States metropolitan area participated in the study as part of their normal math instruction. Twenty-one students' data could not be used due to a technical error in the intervention, and an additional 128 students were dropped from analysis for failing to complete one or more test or the instructional materials. The remaining 332 students included 180 who identified as girls and 152 who identified as boys via an open-ended prompt. No students in the final sample reported identifying as non-binary, another gender, or declined to report their gender. The final sample included students who were assigned to play the original digital learning game *Decimal Point* (48 girls, 39 boys), the redesigned digital learning game *Ocean Adventure*, which had narrative that was rated as more appealing among boys (54 girls, 40 boys), or a digital non-game control (78 girls, 73 boys) that included the same instructional materials but without the game narrative or playful design. Students were randomly assigned to a game or non-game condition at the class level to avoid issues with students playing the game and non-game side-by-side; students were randomly assigned to one of the two game conditions at the individual level. Teachers and researchers present in the classroom avoided providing any direct content help to students; instead, they clarified questions about game mechanics, offered encouragement to struggling students, and pointed students to the built-in hints for content questions.

Decimal Point is a digital learning game teaching decimal number operations by counteracting common misconceptions in students' understanding of decimal numbers. Tasks within the game require students to place decimal numbers on a number line or to perform operations on decimal numbers (add, order, sequence, and compare). The game presents students with a sci-fi, light-hearted amusement park narrative: Aliens have come to earth, and they want to learn about decimal numbers while having fun. The player is tasked with guiding the aliens through an amusement park, where each uniquely themed section has decimal content embedded in instructional mini-games. The aliens encourage students with light-hearted positive dialogue, such as "Give this a try! You'll have fun!" Students complete games

in different sections of the amusement park, including "Catch the Ghost" in the Haunted House area of the park and "Escape the Aliens" in the Space Adventure area.

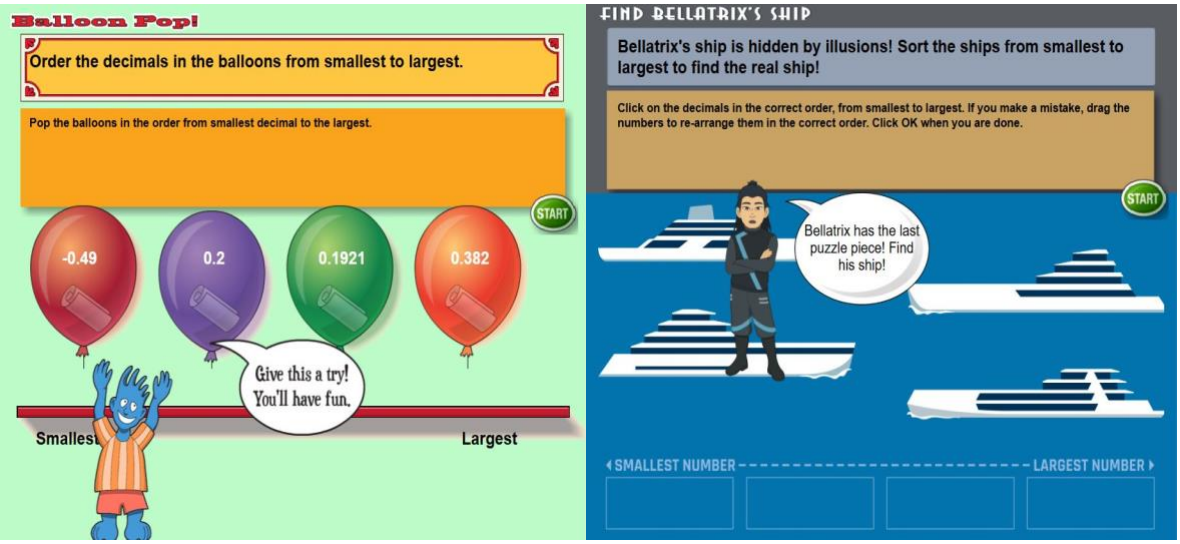

Figure 1. A mini-game within *Decimal Point* (left), with an amusement park narrative, and a mini-game within *Ocean Adventure (*right), with a battle narrative.

Ocean Adventure consists of the same instructional content, but it was redesigned with a new narrative to appeal more to boys based on data collected on students' narrative preferences (Nguyen et al., 2023). Specifically, Nguyen et al. (2023) asked students about the styles of games they preferred; they were also given four game titles with brief narrative summaries and asked to rank their preferences. Boys expressed a preference for action games and overwhelmingly preferred the game titled "War at Sea" with a narrative description that formed the basis of *Ocean Adventure.* Prior research has shown *Decimal Point* typically benefits girls more than boys, and we wanted to experimentally test whether these benefits might be attributed to gender differences in the narrative appeal of the game. In *Ocean Adventure,* students play a special agent who sets out to sea to defeat and capture pirates and criminals. Students receive mission-focused advice in an adventurous, serious tone, such as, "Bellatric has the last puzzle piece! Find his ship!" The game is organized around different pirate hideouts instead of theme park areas, and students complete battles such as "Mirror Maze" in the area focused on pirate villain Bellatrix, or "Break into the Lab" in the area focused on the Doom Island hideout. The non-game control contains the same instructional content as both games but has no game-like narrative. It is a basic, black-and-white digital tutor interface.

Three isomorphic tests were used to assess learning prior to completing the instructional materials (pretest), immediately after completing them (posttest), and approximately one week after completing them (delayed posttest). The tests have been validated in prior studies (Nguyen et al., 2022) and consisted of similar mathematical content to the games, with assessment for near, medium, and far transfer. After completing the learning materials but prior to completing the test, students responded to surveys targeting their interest and engagement in the learning materials and their anxiety and self-efficacy toward the test. We focus on four surveys in this paper: a three-item survey of affective engagement (e.g., "I felt frustrated or annoyed"; Ben-Eliyahu et al., 2018); a three-item survey of situational interest (e.g., "The game/tutor was exciting"; Linnenbrink-Garcia et al., 2010); a four-item survey about test anxiety (e.g., "If I did poorly on this activity, people would look down on me"; Spencer et al., 1999); and a five-item survey about test self-efficacy (e.g., "I could handle this activity"; Spencer et al., 1999). Surveys used a Likert-type scale of 1 (strongly disagree) to 5 (strongly agree).

3. Results

To assess whether students learned from the instructional materials, and whether learning differed based on gender or game condition, we conducted repeated-measures Analyses of Variance (ANOVAs) with time (pretest to posttest, pretest to delayed posttest) as a within-subjects factor and game condition and gender as between-subjects factors. This repeated-measures approach accounted for differences between groups at pretest. Table 1 reports means and standard deviations on all tests. Results indicated a significant effect of time, $F(1, 326) = 196.68$, $p < .001$, $\eta^2_p = .38$, with student performance significantly improving from pretest to posttest. There was also a significant interaction between time and gender, $F(1, 326) = 5.69$, $p = .018$, $\eta^2_p = .017$, with girls improving more than boys from pretest to posttest. There was no interaction of time and game condition, $F(2, 326) = 1.20$, $p = .30$, $\eta^2_p = .007$; and no time, game condition, and gender interaction, $F(2, 326) = 0.06$, $p = .94$, $\eta^2_p < .001$.

Results for the pretest to delayed posttest analysis followed the same pattern, with a significant increase in scores from pretest to delayed posttest, $F(1, 326) = 257.68$, $p < .001$, $\eta^2_p = .44$, and a significant interaction between time and gender, $F(1, 326) = 5.30$, $p = .022$, $\eta^2_p = .016$, with girls improving more than boys from pretest to delayed posttest. There was no interaction of time and game condition, $F(2, 326) = 2.42$, $p = .091$, $\eta^2_p = .015$; and no time, game condition, and gender interaction, $F(2, 326) = 0.82$, $p = .44$, $\eta^2_p = .0005$. These results indicate that students' scores improved from pretest to posttest and from pretest to delayed posttest, and that girls benefitted more than boys across all conditions. There was no evidence that students' learning differed by condition or that girls and boys benefitted differently based on condition.

We conducted a series of 2 (gender) x 3 (game condition) ANOVAs to assess effects on interest, affective engagement, test anxiety, and test self-efficacy. Table 1 reports means by gender and condition. For interest, there was a main effect of condition, $F(5, 315) = 9.758$, $p < .001$, $\eta^2_p = .058$, but no main effect of gender, $F(5, 315) = 0.24$, $p = .63$, $\eta^2_p = .001$, and no significant interaction, $F(5, 315) = 0.19$, $p = .83$, $\eta^2_p = .001$. A posthoc analysis with Bonferroni corrections revealed significantly lower levels of interest only for the non-game compared to *Decimal Point*, $p = .003$, and to *Ocean Adventure*, $p < .001$. This analysis included 321 students (11 missing responses).

For affective engagement, there were main effects of condition, $F(5, 325) = 11.29$, $p < .001$, $\eta^2_p = .065$, and gender, $F(5, 325) = 10.23$, $p = .002$, $\eta^2_p = .031$; girls reported lower engagement than boys. There was no significant interaction, $F(5, 325) = 0.53$, $p = .59$, $\eta^2_p = .003$. A posthoc analysis with Bonferroni corrections revealed significantly lower levels of engagement only for the non-game compared to *Decimal Point*, $p = .002$, and compared to *Ocean Adventure*, $p < .001$. This analysis included 331 students (1 missing).

For test anxiety, there were main effects of condition, $F(5, 314) = 4.68$, $p = .010$, $\eta^2_p = .029$, and gender, $F(5, 314) = 8.60$, $p = .004$, $\eta^2_p = .027$; girls reported higher test anxiety than boys. There was no significant interaction, $F(5, 314) = 0.59$, $p = .55$, $\eta^2_p = .004$. A posthoc analysis with Bonferroni corrections showed significantly higher levels of test anxiety only for the non-game compared to *Decimal Point*, $p = .036$. This analysis included 320 students (12 missing responses).

For test self-efficacy, there were main effects of condition, $F(5, 314) = 4.46$, $p = .012$, $\eta^2_p = .028$, and gender, $F(5, 314) = 5.72$, $p = .017$, $\eta^2_p = .018$, with girls reporting lower self-efficacy than boys. There was no significant interaction, $F(5, 314) = 0.16$, $p = .85$, $\eta^2_p = .001$. A posthoc analysis with Bonferroni corrections showed significantly lower test self-efficacy only for the non-game compared to *Decimal Point*, $p = .028$. This analysis included 320 students (12 missing responses).

Overall, girls reported lower affective engagement and test self-efficacy and higher test anxiety across all conditions. The games, regardless of narrative, tended to increase interest and affective engagement, while *Decimal Point* specifically reduced test anxiety and increased test self-efficacy. Boys and girls were not affected differently by the different game narratives or by the non-game control.

Table 1. *Means and Standard Deviations on Tests and Surveys by Game Condition and Gender*

Cond.	*N*	Pretest	Posttest	Delayed Posttest	Interest	Affective Engmnt.	Test Anxiety	Test self-efficacy
Dec. Point	87	25.1 (10.8)	29.5 (9.6)	30.2 (9.6)	3.1 (1.1)	3.3 (1.0)	2.4 (1.0)	3.7 (0.8)
Girls	48	23.0 (9.7)	28.0 (8.0)	29.5 (8.1)	3.1 (1.0)	3.2 (1.0)	2.5 (1.0)	3.16 (0.9)
Boys	39	27.6 (11.6)	31.2 (11.1)	31.1 (11.2)	3.0 (1.2)	3.6 (1.0)	2.2 (0.9)	3.9 (0.7)
Ocean Adv.	94	22.8 (10.5)	28.7 (9.4)	30.0 (9.2)	3.1 (1.2)	3.4 (0.9)	2.4 (0.9)	3.7 (0.8)
Girls	54	21.2 (9.6)	28.0 (8.6)	28.6 (8.9)	3.1 (1.2)	3.2 (0.9)	2.6 (1.0)	3.6 (0.8)
Boys	40	24.8 (11.4)	29.7 (10.4)	31.8 (9.4)	3.1 (1.2)	3.5 (1.0)	2.1 (0.8)	3.8 (0.9)
Non-game	151	21.8 (9.9)	27.1 (10.1)	28.5 (10.2)	2.6 (1.0)	2.9 (0.9)	2.7 (1.1)	3.5 (0.8)
Girls	78	20.2 (9.6)	26.4 (10.6)	27.8 (10.9)	2.6 (0.9)	2.8 (0.8)	2.8 (1.1)	3.4 (0.8)
Boys	73	23.6 (9.9)	27.9 (9.5)	29.2 (9.3)	2.6 (1.0)	3.0 (1.1)	2.6 (1.1)	3.5 (0.8)

These results indicate that girls reported lower levels of affective engagement and test self-efficacy and higher levels of test anxiety than boys across all conditions. They also reveal that the games, regardless of narrative, tended to increase interest and affective engagement, while *Decimal Point* specifically reduced test anxiety and increased test self-efficacy. There were no interactions between gender and condition, meaning boys and girls were not affected differently by the different game narratives or by the non-game control. Given that the game conditions affected these self-reported measures but did not affect learning outcomes, we examined correlations between the self-reported measures, pre-to-posttest gains, and pre-to-delayed posttest gains. Self-reported measures were generally *not* significantly correlated with learning gains, with the exception of a significant, small correlation between interest and pre-to-posttest gains ($r = .153$, $p = .006$). Other than interest, the remaining self-reported measures all showed significant, medium correlations with each other.

Table 1. *Correlations among test gains and self-reported measures. (*) p < .05.*

	2.	3.	4.	5.	6.
1. Post gain	.718*	.089	.153*	-.054	.023
2. Delayed gain		.063	.083	.010	-.002
3. Affective engagement			.420*	-.477*	.339*
4. Interest				-.029	-.054
5. Test anxiety					-.629*
6. Test self-efficacy					

4. Discussion and Conclusion

In this paper, we tested whether the narrative of a digital learning game would affect learners' affective experiences and learning outcomes. We also investigated whether different narratives would affect boys' and girls' learning and affective experiences differently. In doing so, we tested competing hypotheses that girls' learning advantages from *Decimal Point* might be based on their enjoyment of the game narrative or that they might generally benefit from learning with digital games because they reduce math saliency and, consequently, math and test anxiety. Building on prior research that has shown a consistent learning advantage for girls with *Decimal Point*, we hypothesized that girls would show greater engagement, interest, and learning with *Decimal Point.* If their learning gains were driven primarily by greater engagement compared to boys with the narrative of *Decimal Point,* we hypothesized that girls would not experience the same learning and affective benefits from *Ocean Adventure*, which was designed to appeal more to boys' narrative preferences based on a game preference

survey. Alternatively, we hypothesized that if girls learned more from *Decimal Point* because it reduced math saliency, and therefore girls' negative affect related to math, then girls would show greater learning from both *Decimal Point* and *Ocean Adventure* compared to boys, but not greater learning from the non-game. Additionally, their test anxiety would be lower and their test self-efficacy would be higher in both games compared to the non-game condition.

Results did not provide consistent evidence regarding these hypotheses. In general, there were no interactions between gender and learning condition. This suggests that the different narratives did not affect boys and girls differently, even though the narrative of *Ocean Adventure* was designed specifically to be more appealing boys, based on game preference survey data collected with the target population in a prior study (Nguyen et al., 2023). It may be that the preference differences that emerged when students read brief descriptions of the different narratives were not good predictors of how they would feel when playing the game with the fully developed narrative and graphics. Gender differences related to narrative preference might also be more likely to emerge in games with more immersive narratives. In both games, the narratives provide a framework for organizing learning games, but they lack realism—a positive predictor of narrative transportation (Green, 2010)—and are unlikely to harness the level of focused attention and emotional engagement proposed by narrative transportation theory (Green & Brock, 2000) that can occur when players are transported into the world of a game.

Alternatively, factors other than gender might be better predictors of game preference. Although prior research revealed clear differences in preference based on gender identity (Nguyen et al., 2023), preferences were predicted even more by gender-typed characteristics related to occupational interests, activities, and traits. A measure of gender-typed characteristics would also capture greater levels of gender-related diversity; this may be especially important given the absence of any students identifying outside the gender binary in the open-ended gender question, which is a limitation in our sample. We also failed to replicate prior research showing that girls benefitted more than boys from the game, but not from the non-game control (McLaren et al., 2017). In the current study, girls learned more than boys in both the game and non-game conditions, suggesting the learning benefits were not unique to the game environment. Future work should continue to investigate learning across genders in the game and non-game conditions to resolve these inconsistent findings and determine whether it is the game features or the broader features of computer-supported learning that are helping girls, in particular, to learn these materials.

Results regarding affective experiences generally provided some evidence supporting both an engagement and a math anxiety route to learning with digital games. On the engagement side, all students found the games more engaging and interesting than the non-game control. Narrative did not appear to affect students' engagement or interest. On the other hand, only *Decimal Point* increased students' test self-efficacy and reduced their test anxiety. *Ocean Adventure* results trended in the same directions but were not significantly different from the non-game. It is unclear why *Ocean Adventure* did not have the same effect on test self-efficacy and test anxiety, especially when students found it equally engaging and interesting as *Decimal Point.* One possibility is that the battle narrative of *Ocean Adventure* could create greater affective arousal and tension, which might in turn minimize benefits for test anxiety and test self-efficacy.

Finally, although the games produced significant effects on learners' affective experiences, these affective experiences generally did not predict learning gains. Only interest was significantly correlated with pre-to-posttest gains. This may explain why the game conditions did not lead to significant better learning outcomes compared to the non-game. However, there may still be merit to presenting math practice in ways that are more engaging and interesting, and in ways that lower test anxiety while increasing test self-efficacy. Such changes could affect students' willingness to engage in math practice, their persistence over time, and thus their long-term learning outcomes. If digital learning games lead to lasting changes in students' test anxiety and self-efficacy, it is very likely that those changes would impact learning and test performance over time.

Despite the lack of condition effects on learning, this paper makes several important contributions. Few papers have directly compared the effects of different game narratives in a

math learning game alongside a non-game digital control matched for content. This comparison allowed us to directly compare the effects of different narratives on learners' affective experiences and learning outcomes and has revealed surprising results regarding the effects of different narratives on test anxiety and test self-efficacy. It has also contributed some preliminary evidence that digital learning games might affect students both in terms of their engagement and by reducing testing anxiety and increasing test self-efficacy.

Understanding why *Decimal Point* supports boys and girls differently has both theoretical and practical implications. The comparison of the engagement and math anxiety hypotheses contributes to our theoretical understanding of the different mechanisms through which digital learning games can support students. In particular, relatively little work has investigated whether digital learning games can support learners by reducing math anxiety. We found tentative support for the hypothesis in this study, and future work should continue to investigate the impact of digital learning games on cognitive load and anxiety. In practice, this work could support games as a potential tool for teaching students whose learning is otherwise inhibited by anxiety. Investigating whether narratives choices affect students' learning also has important implications for how digital learning game options are presented to students. For example, if narrative has a minimal effect on learning and affective experience, then designers can focus on creating a single, engaging game rather than creating multiple options for students to choose among. On the other hand, if aligning game features with students' preferences enhances learning and engagement, then creating more game options could improve alignment with individual students' preferences and, in turn, improve student learning outcomes. We believe future work building on comparisons between *Decimal Point* and *Ocean Adventure* will allow us to continue to explore factors that predict students' narrative preferences, how games influence students' affective experiences, and whether those effects ultimately lead to changes in learning behaviors or outcomes.

Acknowledgements

This work was supported by the National Science Foundation Award #DRL2201796. The opinions expressed are those of the authors and do not represent the views of NSF. Thanks to Jimit Bhalani, John Choi, Kevin Dhou, Darlan Santana Farias, Rosta Farzan, Jodi Forlizzi, Craig Ganoe, Rick Henkel, Scott Herbst, Grace Kihumba, Kim Lister, Patrick Bruce Gonçalves McLaren, and Jon Star for important contributions to the development and early experimentation with *Decimal Point*. Thanks also to Rick Henkel, Sarah Di, Em Tyminski, and Kevin He for important contributions to the development and early experimentation with *Ocean Adventure*.

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