Rewriting the Rules: Game-based Learning for Affective and Cognitive Student Engagement in an Undergraduate History Course

Abstract: Constructivist psychology has long demonstrated the potential for play to offer various benefits to learning. This study introduced active game-based learning experiences, in the form of role-playing games, into an undergraduate history course that also included passive lecture and discussion elements. Mixed methods student feedback surveys were used to examine the impacts of game-based learning on students' affective and cognitive engagement in the course and offer a comparison between the lecture and game-based learning experiences. Qualitative data were analyzed through the paradigm of Mohsen, Abdollahi, and Omar's (2019, 518-520) framework for educational value, including affective evaluation, conceptual understanding, skill development, and experiential learning. Students' affective and cognitive engagement during game-based learning were consistently high. While students expressed a slight affective preference for lecture, their cognitive engagement was significantly higher during game-based learning, highlighting benefits beyond those offered by lecture. These results are situated within the context of the extant literature on game-based learning and student engagement and the need for continued exploration of beneficial connections between these constructs, specifically within the higher education classroom setting.

Keywords: game-based learning, student engagement, undergraduate education, history education, affective engagement, cognitive engagement

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1. INTRODUCTION

From its origins in the work of Piaget, Vygotsky, and other developmental psychologists (Waite-Stupiansky 2017, 12) to 21st-century theories of game-based learning (Domínguez et al. 2013, 381-384; Kapp, 2012), the concept of *play* has long been known as an integral part of learning. In fact, Socrates argued that proper play in education leads to responsible citizenry (Carnes 2018, 29). However, while Piaget's theories accounted for changes in the complexity of play aligned with cognitive development (Plass, Homer, and Kinzer 2015, 259-260), his work is often only associated with young children. *Gamification*, which brings game-like elements into a non-game context (Deterding et al. 2011, 2), incorporates understandings from the constructivist school of developmental psychology to which Piaget and his peers belonged, using play to generate motivation and engage students in decision-making and collaborative problem-solving toward a pedagogical goal (Castillo-Parra et al. 2022, 811-813). From gamification evolved *game-based learning,* "a type of game play with defined learning outcomes" (Plass, Homer, and Kinzer 2015, 259).

Game-based learning takes multiple forms in the classroom, predominantly as digital games, but increasingly including role-playing games (RPGs), live action role-playing games (larps), and other analog formats (Brom et al. 2019, 66-67). Larps used as educational tools, commonly referred to as edu-larps, aim to harness motivation, immersiveness, and interactivity to stimulate learning (Bowman and Standiford 2015,

17-20; Brom et al. 2019, 65-66). Westborg (2023, 20-24) further categorizes different types of games as either *leisure games, RPGs in education, stand-alone educational RPGs*, or *educational RPGs/edu-larp.* Each type is delineated based on its framing and gameplay design as either leisure or educational, and games of all four types may include role-playing components. This study utilized an *RPG in education*, or educationally-framed leisure game or simulation whose gameplay has been adapted to fit learning objectives; and four *educational RPGs/edu-larp*, or games whose framework and gameplay were intentionally designed to meet learning objectives (Westborg 2023, 21-22).

Central to the use of game-based learning are its connections to student engagement, or "meaningful student involvement throughout the learning environment" (Martin and Torres 2016, 2) that positively impacts learning outcomes. While students' enjoyment of their coursework alone is not enough to ensure learning (Chew 2022), meaningful engagement, which encompasses affective, behavioral, cognitive, and social domains, is critical to academic success (Bond et al. 2020, 3-4; Bowden, Tickle, and Naumann 2021, 1212-1213; Wu, Van Veen, and Rau, 725). We focused our investigation on the potential impacts of game-based learning on *affective engagement,* defined as students' perceptions of and satisfaction with the learning experiences (Bowden, Tickle, and Naumann 2021, 1212; French, Mulhern, and Ginsberg 2019, 3), and *cognitive engagement,* or the degree to which students are meaningfully involved in learning in a manner that contributes to course learning outcomes (Martin and Torres 2016, 2; Tang and Hew 2022, 5).

This study contributes to the literature on game-based learning in higher education, an area of growing interest but limited systemic investigation (Castillo-Parra et al. 2022, 799-804). We examine how the relationships between game-based learning, specifically edu-larp and other RPGs, and student engagement as evidenced in other educational settings (Bowman and Standiford 2015, 9; Brom et al. 2019, 72) and disciplines (Contreras-Espinosa and Eguia Gomez 2020, 805; Freeman et al. 2014, 8412; French, Mulhern, and Ginsberg 2019, 4) might apply in undergraduate history courses. We supplemented the lecture and discussion formats of one such course with game-based learning experiences to investigate these connections through the following research questions:

1. How does the use of role-playing games impact students' affective engagement, or perception of learning?
2. How does the use of role-playing games impact students' cognitive engagement?
3. What differences exist in affective and cognitive engagement between students' experiences with game-based learning and lecture formats?

2. GAME-BASED LEARNING EXPERIENCES

2.1 Context

As a strategy to increase student engagement with course content, the College of Arts and Sciences at University of South Carolina implemented a themed semester based on Piaget's theory of play. This play-themed semester was the College of Arts and Sciences' third iteration of a themed semester, selected based on the College's philosophy that play can be "a powerful method of exploration that often results in finding a unique perspective that can lead to a truly original idea" (University of South Carolina, n.d.) and the growing evidence that active learning strategies, such as game-based learning, can improve students' academic performance (Freeman 2014, 8412-8413). These themed semesters provide instructors with opportunities to receive funding to develop and teach unique courses focused on special topics or innovative strategies related to the theme through the lens of their departmental discipline. The play-themed semester initiative provided the opportunity to reimagine an undergraduate history course by integrating role-playing games into course instruction as a complement to lecture and discussion components.

2.2 Games

The course, an undergraduate survey on the history of science and technology, incorporated five different games. These games were chosen for their alignment with course learning objectives and purposes of critical thinking, historical analysis, and teaching historical content. The course utilized one RPG in education and four edu-larps, as characterized by Westborg's (2023, 20-24) RPG design matrix. Some gameplay was modified to fit within the class meeting length or align with course learning objectives. The RPG in education game was pilot tested with the history department's graduate students prior to the semester. This pilot allowed the faculty instructor to assess where framing or gameplay modifications would be necessary to achieve course learning objectives. All games are described in table 1, which details the environment, game design, description, and structural modifications.

Table 1: Game detail.

Game	Design	Description	Modification
Buul	RPG in education	Mayan war game with objective similar to checkers	None
RTTP Trial of Galileo	edu-larp	Reenactment of Galileo's trial	Time reduced to 1 class session
RTTP Babbage	edu-larp	Debate over merits of Babbage's difference engine	Time reduced to 1 class session
RTTP Charles Darwin	edu-larp	Reenactment of Royal Society debates of Darwin's research	Time reduced to 1 class session
Robert Yerkes' Army IQ Test	edu-larp	Simulation of U.S. Army IQ test given in 1910s	Shortened version to fit time limits

Note: *RTTP* = Reacting to the Past games.

2.3 Modifications

Buul, also known as *Boolik* or *Puluc*, is an ancient Mayan leisure game played by warriors in preparation for battle, and it functioned here as an RPG in education. No modifications were made to actual gameplay, with the exception of modernized playing pieces. Instead of using rocks and pebbles, students used popsicle sticks and plastic disks. Although this game plays similarly to checkers and no role-playing is needed, students were instructed to assume the persona of an ancient Mayan warrior as they strategized their attack on the other player. Students were asked to conceptualize the game in that setting, thus considering how the Mayans thought about interactions with other tribes and peoples.

The three *Reacting to the Past (RTTP)* edu-larp games were designed to be played over multiple class periods, which was not possible in the context of a large survey course. Each of these was reduced to a single class period. For instance, the *Trial of Galileo* is designed to be played over 13 class sessions. The first three

class sessions are setup sessions. Class sessions 4-7 center on the original inquisition of Galileo in 1616. Session 8 is an information session. Sessions 9-11 deal with Galileo's trial in 1632. Sessions 12 and 13 occur after Galileo's death (Petterson, Purnell Jr., and Carnes 2014, 43-44). Risk, the course instructor, completed all the setup (sessions 1-3) to avoid using class time.

The original inquisition and Galileo's *Dialogue of the Two Chief World Systems* (sessions 4-8) were covered in lecture, giving students the background information needed to play the game. The teaching assistants (TAs) leading the game sessions were instructed to focus gameplay on the Trial of 1632 (sessions 9-11), and students were randomly assigned their roles a week before the game session. The TAs debriefed the students after gameplay was completed to ensure connections to the learning outcomes (Lacanienta 2022, 71). This debriefing paralleled the game's post-mortem sessions (12-13). While students engaged with the material differently than in the original game design, we believe this experience achieved the same learning outcomes. Students still engaged in simulations of historical events and took part in the intended debates, albeit within a shorter time.

Similarly, *Babbage, Ada Lovelace, and the Dawn of Computing* was designed to be played over six game sessions and three labs. Per the gameplay instructions, the "instructor may omit the labs, and/or include more or fewer game sessions than those outlined here" (Meysenburg 2016, 35). As with the *Trial of Galileo* game, Risk completed all the setup prior to the game session. Students were randomly assigned their roles a week before the game session. The topic of Lab 3 was covered by a video discovered by one of the TAs, which provided a clear explanation of Babbage's analytical engine. Students then debated the merits of Babbage's analytical engine in the setting of a meeting of the Royal Society. The debate centered on whether the state should fund Babbage's engine (session 6). Here again, we do not feel the reduction of game time impacted the students' learning or reactions to the game. Similarly to the *Trial of Galileo* game, students still engaged in the simulation of the historical event and gained critical skills and knowledge by participating in the intended debates.

Darwin, the Copley Medal and the Rise of Naturalism, 1861-1864 was designed to be played over eight class sessions (Driscoll, Dunn, Siems, and Swanson 2014, 27-31). Because the course learning objectives emphasized Charles Darwin and Alfred Russel Wallace, several sessions were deemed expendable without impacting the student learning objectives set forth in the syllabus. Session 2, examining Darwin's views and philosophy, was covered in the lecture portion of the class. The game was then set up to debate only Darwin's contributions to natural philosophy (session 7) compared to other philosophers discussed in lectures. While this may have impacted student learning about other philosophers discussed in the game, removing sessions 1, 3-6, and 8 did not change the intended learning of the course. Thus, the game was used more as a guide than strict adherence to the game rules.

Each of the original *RTTP* role-playing games included pre-configured writing assignments (essays, speeches, etc.) based on the individually assigned roles. These assignments were not always equitable, with more prominent roles given more assignments to complete. For this reason, none of the pre-prescribed writing assignments were required. Most students still completed them to become familiar with their assigned roles, but the assignments were never part of the graded exercise. While this may have altered students' understanding of their assigned roles, particularly if they did not complete the pre-configured assignments, we do not believe this modification adversely impacted the learning outcomes.

The Yerkes Army IQ test was not modified by the instructor, but rather by the source used to construct the activity. The article "Measuring Mental Fitness: Government IQ Tests during World War I" provides an abbreviated version of Robert Yerkes' Army IQ test from the 1910s (SILO 2016, 6-13). Risk demonstrated the test for each of the four TAs in the first of their three assigned discussion sections. The demonstration simulated the original 1910s testing environment as closely as possible. Students were not told about the test in advance. During the testing, Risk walked around the room telling students to "hurry up" and that they

were "running out of time" in a raised voice, simulating a drill sergeant raising his voice to new army recruits. The TAs were instructed to simulate that same environment in their remaining discussion sections.

3. METHOD

3.1 Setting and Participants

Participants (n = 312) were undergraduate students enrolled in a synchronous, in-person history course. This course was a large, introductory survey on the history of science and technology with 312 undergraduate students, meeting three times a week for 50 minutes. Two meetings each week took place in a large lecture hall accommodating all 312 students and consisted of lectures on historical content given by the faculty instructor. The third meeting each week took place in smaller classrooms accommodating groups of 25 to 30 students each. These smaller meetings, commonly referred to as discussion sections, were led by teaching assistants (TAs). The discussion sections allowed students to delve deeper into lecture topics by focusing on a particular aspect of the lectures or a specific supplementary content item. The TAs implemented the game-based learning experiences in these smaller discussion sections under the guidance of the faculty instructor. The games replaced the weekly discussion of the lecture topic by engaging students in related historical role-playing scenarios.

3.1.1 Ethics

Our institution's IRB approved the study, and the data collection procedures anonymized participant identities. Student participants were informed via the course syllabus of the purpose of data collection, the expectations for completing feedback surveys, and the anonymity of their responses. Because all components of students' involvement were exempted as "normal educational practices" (OHRP 2021), additional consent was not required.

3.2 Data Collection

To examine how game-based learning impacted students' cognitive and affective engagement in the course, we collaboratively designed and piloted a mixed method student feedback survey to be deployed following each game session in the classroom. The survey instrument contained 12 questions, including a mix of Likert-style rating scales and open-ended responses, listed in table 2. Likert-style ratings ranged from 1 (lower engagement) to 10 (higher engagement), divided across three constructs: affective engagement (2 items, α = 0.86), cognitive engagement (2 items, α = 0.88), and comparison between game-based learning and lecture (2 items, α = 0.83). The remaining items consisted of open-ended questions relating to the same constructs.

The surveys were created in an electronic form tool and distributed to students following each game via links embedded into the course site in the institution's learning management system (LMS). Access to complete the form was restricted to institutional users, while access to the anonymous responses was restricted to only the authors. Following each game, students were asked to complete the survey at their convenience within a week. Participation was incentivized by offering extra credit toward their course grades for submitting a screenshot of their completion confirmation in the LMS. This strategy generated a 59% response rate while maintaining student anonymity. While Risk had de facto access to student identities and timestamped LMS submissions as the course instructor, Hoke had no access to any student data. Only Hoke had access to the raw form response outputs and removed the timestamps before sharing with Risk, thereby keeping the survey results anonymous to both authors.

Table 2: Student survey items.

Item No.	Item Text
1.1	On a scale of 1 to 10, with 1 being *low* and 10 being *high*, rate your satisfaction with this game as we played it in class.
1.2	On a scale of 1 to 10, with 1 being *very unlikely* and 10 being *very likely*, how likely are you to recommend this class to your friends based on your experience playing this game?
1.3	What, if anything, did you enjoy about playing this game in class?
1.4	What, if anything, did you dislike about playing this game in class?
2.1	On a scale of 1 to 10, with 1 being *not at all* and 10 being *very much*, how much did you feel that you were meaningfully involved in learning during the in-class game?
2.2	On a scale of 1 to 10, with 1 being *not at all* and 10 being *very much*, how much do you feel that this game contributed to achieving the course learning outcomes?
2.3	What specific knowledge or skills did this game help you to develop?
2.4	What would you change or improve about the use of this game in future courses?
3.1	On a scale of 1 to 10, with 1 being *low* and 10 being *high*, rate your satisfaction with the lecture sessions leading up to the game.
3.2	On a scale of 1 to 10, with 1 being *not at all* and 10 being *very much*, how much did you feel that you were meaningfully involved in learning during the lecture sessions?
3.3	If you were taking this course again, would you prefer to enroll in a section that includes a combination of lecture and gameplay (like this one), or one that includes only lecture?
3.4	In what ways was your learning experience playing this game different from your learning experience in the lecture sessions?

3.3 Data Analysis

Data from the quantitative and qualitative portions of the student surveys were analyzed separately before being synthesized to draw conclusions.

3.3.1 Missing Data

Out of a total of 924 survey responses from all games, 20 were flagged for review due to instructor suspicion or a student's admission that they were not present for the game but had completed the survey anyway. Due

to the anonymous nature of the data, we could not definitively determine the legitimacy of these responses, representing 2.16% of the data. We elected to exclude these responses in favor of increased rigor, and independent-samples *t*-tests confirmed that this exclusion created no significant differences in the means of the quantitative items at $p < 0.05$.

3.3.2 Quantitative Analysis

Statistical analysis of the quantitative data was conducted using JASP 0.17.2.1. In light of the small number of quantitative items available to evaluate internal consistency, we conducted a confirmatory factor analysis to assess the construct validity of the survey (Atkinson et al. 2011, 559; LaNasa, Cabrera, and Trangsrud 2009, 318), along with descriptive statistics to provide an overview of students' reactions. To draw comparisons between students' affective and cognitive engagement during gamified learning versus lecture, we conducted a Wilcoxon signed-rank test due to the non-normal distribution of the responses.

3.3.3 Qualitative Analysis

The growing literature on game-based learning in higher education notes the influence of games on both the affective and cognitive domains of student engagement and the tendency for these factors to overlap (Bowman and Standiford 2015, 6-9; Ke, Xie, and Xie 2016, 1196). Based on the conceptual structure for educational value described by Mohsen, Abdollahi, and Omar (2019, 524-526), we developed an a priori analytical framework that included themes of *affective evaluation*, defined as affective or emotion-based reactions; *conceptual understanding*, defined as cognitive engagement with the game or course materials; *skill development*, defined as real-world cognitive, behavioral, and/or social skills utilized for participation in the games; and *experiential learning*, defined as characteristics of the games that directly influenced student engagement. Within this framework, we employed line-by-line concept coding (Saldaña 2016, 119-124) to represent and categorize the experiences identified in students' responses.

Students' narrative responses were exported to the CAQDAS tool Delve. The initial round of coding yielded 91 unique codes across 2,731 content items. Codes were tagged as belonging to one of the four educational value themes: *affective evaluation* (819 content items; 28 unique codes), *conceptual understanding* (542 content items; 14 unique codes), *skill development* (443 content items; 33 unique codes), and *experiential learning* (684 content items; 16 unique codes). Initial concept codes were reviewed to combine those that were redundant, followed by two subsequent rounds to group conceptually similar codes. This process, combined with review of researcher notes on emergent patterns, generated categories central to each of the four educational value themes.

4. RESULTS

Data from the quantitative and qualitative portions of the student surveys were analyzed separately before being synthesized to discuss the study research questions.

4.1 Quantitative Data

Quantitative analysis included a confirmatory factor analysis, descriptive and internal consistency statistics, and a Wilcoxon signed-rank test to compare game-based and lecture experiences.

4.1.1 Factor Analysis

We conducted a confirmatory factor analysis using a manual setting for three factors. The identified factors correlated with the study constructs as: Factor 1 = affective engagement, Factor 2 = cognitive engagement, and Factor 3 = perception of lecture, displayed in table 3. Factor loadings were identified at a minimum threshold of ≥ 0.4. While the survey items related to Factor 1 (affective engagement) loaded strongly on that factor, one item intended for Factor 2 (cognitive engagement) loaded more strongly on Factor 1. All items intended to relate to Factor 3 (perception of lecture) loaded onto that factor. This suggests that the concepts of affective and cognitive engagement as measured through this instrument may not be fully extricable from one another, but that students' perception of lecture-based learning environments can be measured independently.

Table 3: Pattern factor loadings.

Item No.	Factor 1	Factor 2	Factor 3
1.1	**0.86**	0.06	-0.05
1.2	**0.90**	-0.08	0.04
2.1	0.07	**0.93**	0.02
2.2	**0.60**	0.29	0.01
3.1	0.24	0.00	**0.58**
3.2	-0.13	0.01	**1.07**

Note: Factor loadings (≥0.4) in bold. Factoring method: max likelihood. Oblique rotation method: promax.

4.1.2 Student Reactions

Descriptive statistics (mean, median, range, and standard deviation) were calculated for each quantitative survey item and are displayed in table 4. Students' mean ratings for each quantitative item were all greater than 7, with median scores of 8 (on a 10-point scale), indicating that students perceived both the lectures and game-based learning experiences favorably. Cronbach's alpha for each survey construct ranged from α = 0.83-0.88, suggesting excellent internal consistency within each group of items. However, the large standard deviation and range exhibited across the data sets suggest high variability between individual student responses.

Students rated their affective engagement, or satisfaction, during the games (M = 7.77) as slightly lower than their cognitive engagement, or meaningful involvement in learning (M = 7.82), during those same sessions. However, this perception was reversed during lecture, where students reported feeling very satisfied (M = 8.22), but far less meaningfully involved (M = 7.70). Overall, students rated their perception of lecture (M = 7.96), affective engagement (M = 7.77), and cognitive engagement (M = 7.82) as very similar.

Table 4: Descriptive statistics.

Construct and Item No.	*M*	*Mdn*	*SD*	*Ra*	Cronbach's *α*
Affective engagement	**7.77**	**8**	**2.16**	**9**	**0.86**
1.1	8.09	8	1.97	9	
1.2	7.46	8	2.29	9	
Cognitive engagement	**7.82**	**8**	**2.11**	**9**	**0.88**
2.1	7.88	8	2.07	9	
2.2	7.77	8	2.15	9	
Perception of lecture	**7.96**	**8**	**1.97**	**9**	**0.83**
3.1	8.22	8	1.78	9	
3.2	7.70	8	2.12	9	

Note: *M* = mean, *Mdn* = median, *SD* = standard deviation, *Ra* = range, *α* = internal consistency.

4.1.3 Comparisons Between Game-based Learning and Lecture

The distribution of student ratings for all items skewed heavily positive, with almost no students providing ratings lower than 4 (out of 10) on any single item. Because of this non-normal distribution, the nonparametric Wilcoxon signed-rank test was utilized to compare responses to parallel items rating affective engagement (items 1.1, 3.1) and cognitive engagement (items 2.1, 3.2) during game-based learning and lecture, respectively. Results are displayed in table 5.

Table 5: Comparison of game-based learning and lecture.

Compared items	***W***	***z***	***p***	**Effect size**
1.1 - 3.1 (affective)	56341.500	-1.80	.07	-0.09
2.1 - 3.2 (cognitive)	73421.500	2.40	.02	0.12

Note: *W* = Wilcoxon signed-rank test. Effect size given as matched rank biserial correlation.

One comparison of items indicated a small preference for lecture (negative *z* statistic), while the other indicated a stronger preference for game-based learning (positive *z* statistic). Students reported a slight affective preference for lecture at a limited significance threshold ($z = -1.80$, $p = .07$), but they reported feeling far greater cognitive engagement during the game-based learning experiences ($z = 2.40$, $p = .02$).

4.2 Qualitative Data

Narrative survey responses were concept coded and tagged as belonging to one of the four educational value themes. Within these themes, individual codes were first placed into conceptually similar groups to describe student experiences, then the groups were organized into larger categories of responses within each theme. Table 6 displays a list of code groups and categories within each theme.

Table 6: Qualitative codes and categories.

Educational value themes	Categories	Sub-groups
Affective evaluation	Procedural/organizational observations	Procedural observations
		Gamification elements
	Relative enjoyment and/or satisfaction	Making learning fun
		Challenges/negative reactions
	Intrapersonal reflections on experience/motivation	Sources of motivation
		Reflections on experiences
Conceptual understanding	Enhanced content knowledge	Improved understanding
		Factual knowledge
	Application of concepts	Application of concepts
	Contextual/cultural understandings	Contextual understanding
		Enhanced cultural awareness
Skill development	Executive function and decision-making	Executive function
		Decision-making
	Interpersonal communication and collaboration	Peer communication
		Collaborative learning
	Critical thinking and reasoning	Critical thinking
		Reasoning/synthesis
	Social-emotional intelligence	Social-emotional intelligence
Experiential learning	Personal connections and perspectives	Personal connection
		Perspective-taking
	Ownership and self-awareness of learning	Student-directed
		Supportive of diverse learners
	Social learning	Interactivity
	Active involvement in learning	Active involvement
		"Hands-on"

4.2.1 Affective Evaluation

Approximately 30% of all coded items consisted of affective evaluation of the game-based learning experiences, defined as affective or emotion-based reactions, falling into three categories.

Procedural and organizational observations. These were most frequently reactions to the amount of time allotted for the game or observations about gamified elements that students found notable, particularly aspects of competition embedded in the games. While there was some variability among opinions on time and pacing, most comments indicated a preference for more time allotted to gameplay. This may have been influenced by the instructor's modifications to several games to limit their duration. In related responses, students suggested allocating additional time and resources to individual or small group preparation, particularly for the debate and simulation edu-larp games.

Relative enjoyment and satisfaction. The largest portion of affective evaluations related to satisfaction with the game-based learning experiences, the majority of which were positive. Students observed that the games made learning fun, created a high-interest environment, and, as one participant stated, "I enjoyed how it made learning...fun and competitive. I feel like I'm more likely to retain information." Among students

who indicated lower satisfaction, challenges expressed included finding the gameplay difficult to understand or connect to the content, feeling stressed or anxious about public speaking or interacting, or simply disliking debate.

Intrapersonal reflections on experience and motivation. The remaining affective evaluations were self-reflective. Many framed the games as sources of motivation, sparking curiosity and integrating novel, surprising, and occasionally competitive elements. Students also found motivation in the sense of accountability to and collaboration with peers: "I enjoyed the opportunity to work with and share knowledge with classmates before the argument. Each person contributed ideas and strategies that were different." Students reported feeling more open to considering others' differing viewpoints and also acknowledged frustration when peers did not participate as fully as intended.

4.2.2 Conceptual Understanding

The smallest portion of unique codes related to students' conceptual understanding, or cognitive engagement, with the games.

Enhanced content knowledge. Students indicated nearly universally that the games strengthened their factual knowledge and deepened their understanding of the content. Some reasoning as expressed by students included, "it allowed me to be a part of what I was learning," "with everyone researching, I learned more," and "the game play lets me dive deeper into what we were learning and discover more interesting facts that I might not have noticed the first time."

Application of concepts. The games also invited students to apply content knowledge to role-play actual or hypothetical historical situations. Students reported that the games improved their ability to retain information, check understanding, and connect their learning to the modern world. Some suggested that lecture and gameplay served complementary purposes; as one student described, "In the lecture I feel like I learned a lot more about the content, whereas in the game it felt...more about how I would apply what I already knew."

Contextual and cultural understanding. Related responses featured observations that the games improved students' contextual understanding, particularly surrounding historical inequities, cultural biases, and the interplay between historical factors. Rather than explicit statements from the instructor, the games illustrated "subtle information about their culture...that a lecture wouldn't be able to explain."

4.2.3 Skill Development

Skill development, defined as real-world cognitive, behavioral, and/or social skills utilized for game participation, constituted the largest proportion of unique codes.

Executive function and decision-making. As edu-larp and other RPGs typically require player decision-making, this was identified as a skill necessary for success. Students noted that these decisions included strategizing and problem-solving, and that their participation provided practice with performing under stress in what was ultimately a low-stakes situation. They also engaged executive function skills, including organization, focused observation, time management, planning, and following directions.

Interpersonal communication and collaboration. The most widely reported skills related to peer communication and collaborative learning. In addition to enjoying interactions with classmates, many students identified peer interaction and communication as skills they practiced through role-playing. Students indicated that these collaborations enabled them to strengthen specific skills, such as listening, mediation, leadership, and flexibility, required them to work as a team, and improved their learning, as "working and discussing with peers helps me...understand the material much better."

Critical thinking and reasoning. Through preparatory exercises and gameplay itself, students engaged in a considerable amount of critical thinking, reasoning, and synthesis of information. Related skills, such as analytical reading, comprehension, and problem-solving, were challenged and sharpened. The complexity of several games involving role-play of detailed historical scenarios offered practice in research, logical reasoning, and developing evidence-based arguments, as described by one student, "I learned how to back up my argument, and do research to find stronger evidence for my topic. This helped me develop a stronger voice when it comes to explaining/arguing on why my side is right," a skill they later transferred to a research paper assignment.

Social-emotional intelligence. Though the course learning objectives did not explicitly address social-emotional intelligence, several students identified social-emotional skills or traits that were bolstered by the game-based learning experiences. These included confidence, creativity, patience, and empathy for the experiences of others. The most frequently reported trait strengthened through play was confidence, in statements such as, "I don't feel scared to speak up, I don't feel like I will be called stupid for my ideas or opinions." Related responses suggested that students, particularly those who initially felt anxiety about speaking in front of peers, experienced improved confidence and decreased stress due to the less formal atmosphere and the opportunity to practice these skills in multiple low-stakes activities throughout the semester.

4.2.4 Experiential Learning

In addition to the types of affective and cognitive engagement expressed by the first three themes, responses also identified experiential learning characteristics, or features of the games that directly influenced engagement.

Personal connections and perspectives. Students overwhelmingly observed that the game-based learning experiences aided them in making personal connections to the content and taking the perspectives of others, including historical figures in the games and their own classmates. Students stated that the games' immersive nature made history "more relevant and easier to comprehend." Particularly in the edu-larp format, students explained that "I felt like I was able to go back in time when I was playing," and it "helped me to think about the feelings and thoughts of others." In this format, students were assigned to roles by their TAs rather than selecting their own. While some found this challenging, others observed benefits: "Having to take a side that I would not have chosen if I had the option before the trial began was beneficial. It made me look at 'facts' of the times and try to construct an argument."

Ownership and self-awareness of learning. Students perceived the games as strongly student-directed and supportive of diverse learners. Several described the games as "student-led" and found it appealing that role-playing included high levels of autonomy and "choice." As primarily first- or second-year students taking a high proportion of introductory courses in traditional lecture formats, participants expressed surprise at their ability to engage through the games in "versatile" ways and "contribute to our own learning" through flexible options for non-verbal participation and "learning through what I was seeing." Students described the game environments as "inclusive and engaging" for those with diverse learning preferences.

Social learning. The games' interactive nature was among the characteristics students most frequently commented upon. Students reacted positively to the opportunity for increased peer interaction, describing it as "a much more interesting way to learn." The games were perceived as novel interactions compared to regular class discussion, described as "a unique way to interact with others to learn more about the content rather than just listening," and "playing the game allowed me to interact with my peers in a different manner than in the discussion sections."

Interactivity was heavily tied to perceptions of effectiveness. Students whose classmates did not engage as intended were quick to suggest that the instructor should "encourage everyone to be more involved." When participation was widespread and equitable, students noted it as an aspect they most enjoyed, as described following one game session: "I enjoyed...how involved we were as a class. Everyone participated and played a role."

Active involvement in learning. Active and immersive characteristics of the games were one of the most frequently mentioned topics in student responses across all themes. Students repeatedly described themselves as "more engaged and attentive" during games and "actively engaging and taking in the same information, just with a different method" compared to lectures. Over 100 unique responses specifically credited the "hands-on" nature of the games, as in one observation: "The game makes the learning hands-on, which makes me more attentive and active when absorbing knowledge."

This was closely tied to students' perception of the games as immersive, which they believed aided them in understanding content, retaining information, paying attention, and shifting their perspectives. The particular importance within the context of history was underscored by responses such as, "I feel more involved in the games than I do [in] the lectures because I get to play a role and put myself in history rather than just viewing it" and, "I enjoyed connecting to the historical population through playing the game because it made history feel more personal and relatable."

5. DISCUSSION

The evidence generated through student surveys has implications for each of the three research questions in this study:

1. How does the use of role-playing games impact students' affective engagement, or perception of learning?
2. How does the use of role-playing games impact students' cognitive engagement?
3. What differences exist in affective and cognitive engagement between students' experiences with game-based learning and lecture formats?

5.1 Affective Engagement

Affective engagement, defined as students' perceptions of and satisfaction with their learning experiences (Bowden, Tickle, and Naumann 2021, 1212; French, Mulhern, and Ginsberg 2019, 3-4), is a key aspect of students' emotions in the classroom. While positive emotions have long been under-researched in education (Goetz and Hall 2013, 192), they are believed to promote other pro-learning behaviors, such as motivation, problem-solving, and self-regulation (Castillo-Parra et al. 2022, 807-810; Pekrun 2016, 575-577). Quantitative data in this study indicate that students had positive perceptions of the game-based experiences, both when rating their own satisfaction (M = 8.09) and when reporting their likelihood of recommending the course to a friend (M = 7.46), evidence that this use of edu-larp and RPG in education led to positive affective engagement with the learning experiences.

Students' narrative comments support this conclusion. In particular, students characterized the experiences as "fun" on 111 independent occasions and observed that "having fun makes good learning." Students also noted that certain game aspects, such as novelty, competition, deception, and chance or luck, contributed to increased motivation that was not solely grade-related (Carnes 2018, 73) and that the role-playing nature of the edu-larp games in which they were asked to take a stance on a historical issue made them feel more open to considering others' perspectives.

As positive emotions positively correlate with motivation and academic success (Williams, Childers, and Kemp 2013, 220-222), students' affective engagement is likely to connect to cognitive engagement (Ke, Xie, and Xie 2016, 1196). The cross-loading of survey items on affective and cognitive engagement factors supports this connection. One student's statement captured attitudes expressed by many: "The game was more informal and fun. It was also easier to join in. In a regular discussion section, I often miss my chance to make a point or feel like my points aren't valid. I felt more comfortable playing this game, pretending to be someone else."

5.2 Cognitive Engagement

We defined cognitive engagement as the degree to which students are meaningfully involved in learning in a manner that contributes to course learning outcomes (Martin and Torres 2016, 2; Tang and Hew 2022, 5). Extant literature suggests that students' positive emotions are related to their meaningful involvement in learning (Bond et al. 2020, 3), and our finding of overlapping factor loadings related to affective and cognitive engagement supports this conclusion. This was further evidenced by students' reports of feeling meaningfully involved in learning during the games (M = 7.88) and expressing the belief that the game-based experiences contributed to course learning outcomes (M = 7.77). These results indicate that students not only enjoyed the games but were also highly cognitively engaged during these experiences, consistent with Carnes' observation that "by internalizing different selves and ideas,...students [ask] more questions about who they [are] and what they [believe] . . . They [do] not have to be told to think critically; the new occupants within [force] them to do so." (Carnes 2018, 122).

Cognitive engagement and associated academic success can be increased through instructional strategies, such as game-based learning, that actively involve students in the learning process (Schettig et al. 2023, 19-20; Wu, Van Veen, and Rau 2019, 734). Students cited the "hands-on" nature (n = 107) of the games and overwhelmingly noted feeling actively involved (n = 242) during the game sessions. Their conceptual understanding was enhanced through content knowledge, opportunities to apply concepts, and deeper contextual and cultural understandings, and they acquired or strengthened skills in the areas of executive function and decision-making, interpersonal communication and collaboration, critical thinking and reasoning, and social-emotional intelligence. The game structures varied but tended to require common academic behaviors, such as planning, organization, decision-making, and time management, and students reported that these skills were strengthened through role-play practice. These advantages were reported following multiple games, suggesting that students benefited not only from *what* they were learning, but *how*.

Of note were reactions related to interpersonal communication and collaboration. Most students highlighted peer interaction as an enjoyable feature, as it "allows other students to talk to each other about course materials in a fun way." Many also noted interactivity as a useful learning experience, observing that it helped them to gain "a greater comprehension of the concepts discussed in lecture," "get different perspectives," and "connect ideas and big picture concepts." Unexpectedly, some students framed peer interaction as a skill requiring practice. Some amount of apprehension about performative elements such as public speaking and debate was expected. However, several students felt unsure about how to interact with their classmates, even informally. For these students, the interactive games were vital to helping them practice "social skills," "talking to others," and "better communication skills," leading to reactions such as, "I'm more comfortable speaking with my classmates," following the game-based experiences.

5.3 Comparison to Lecture

In this application of game-based learning, edu-larp and an RPG in education were integrated as discrete sessions within courses that also included lecture and group discussion, enabling direct comparisons of game-

based learning versus lecture from the same student sample. These comparisons yielded mixed results. Students rated their cognitive engagement as significantly higher during games compared to lectures ($z = 2.40$, $p = .02$). However, they reported a small affective preference for lecture over game-based learning ($z = -1.80$, $p = .07$).

Multiple perspectives exist in the literature, with some studies suggesting that students prefer RPGs over lecture (Crow and Nelson 2015, 30-31) and others documenting student resistance to active methods such as gamification and collaboration, even when those strategies improve learning (Deslauriers et al. 2019, 19253-19254; Prunuske et al. 2016, 138). This resistance tends to be strongest in students who are accustomed to passive learning (Felder 2007, 184; Prunuske et al. 2016, 137), which may explain why these largely first- or second-year students, unlikely to have taken previous collegiate history courses in a lecture format, expressed minimal resistance.

Students' narrative responses identified beneficial game elements not present in lecture, including perspective-taking, ownership and self-awareness of learning, social learning, and active involvement. Students highlighted the immersive nature of the games, noting that "the game allows me to interact with history rather than hear about it" and "I enjoyed being able to experience the game from the point of view of the people of the time. You get to step out of the observation-only learning and...experience learning through your own emotions." This immersion aided students in finding personal or modern connections to historical events and considering others' perspectives, including both historical figures and their own peers, supporting the conclusion that role-immersion games reverse the psychological dynamic of the "silent classroom" (Carnes, 2018, 137) that frequently manifests in lecture-based courses. While the *Trial of Galileo*, *Babbage*, and *Darwin* edu-larp games used in this study were facilitated in the discussion sections by TAs, actual gameplay was student-led, promoting active participation by most students.

Though students expressed initial nervousness over interacting with and speaking in front of classmates, the social and active game elements were ultimately viewed by many as helpful. Some admitted that "in lecture I get distracted by other things or find myself not paying my full attention," but during the games, "I was more involved in learning because I was actually playing the game instead of just hearing about it." Responses ultimately reflected an appreciation for the game-based experiences that acknowledged them as challenging but beneficial, as one student summarized: "Having to put myself in the thought process of a person from that time helped me to contextualize everything I have learned about this piece of history."

6. CONCLUSION

This study contributes to the developing understanding of relationships between game-based learning and affective and cognitive student engagement in higher education, framing the findings according to types of educational value (Mohsen, Abdollahi, and Omar 2019, 518-520). In keeping with extant literature, affective responses indicated that students felt motivated during the games, yet expressed a slight preference for the passive learning of a lecture (Deslauriers et al. 2019, 19253-19254; Prunuske et al. 2016, 137-140). Students found the games highly cognitively engaging, both in strengthening conceptual understanding of course material and in providing opportunities for skill development of pro-learning behaviors, which may be connected to positive emotions (Pekrun 2016, 584-585; Williams, Childers, and Kemp 2013, 220-222). Students identified multiple experiential learning characteristics as integral, including personal connection, ownership, social learning, and active involvement. The games' emphases on perspective-taking and engagement served to further the aims of the College's themed semester mission (University of South Carolina, n.d.).

6.1 Limitations

This study's primary limitation is its use of a voluntary, self-reporting instrument. While small, grade-based incentives were offered to encourage students to submit the surveys, some students did not, introducing the potential for nonresponse bias. Because the response rate was nearly 60% with no identifiable systemic source of error, this is unlikely to have impacted the aggregated results (Nulty 2008, 307-310). A second limitation is the potential for social desirability bias, leading students to submit responses they believe align with the instructor's wishes. However, because the survey was fully anonymous to the course instructor, TAs, and authors, we consider this risk to be minimal.

6.2 Recommendations for Future Research

These results suggest that the use of edu-larp and RPGs in education in the context of a collegiate history course can positively impact student learning through affective and cognitive engagement, making this strategy worthy of continued investigation. Building on this work, we recommend future research that implements procedural suggestions from students to revise the game-based learning experiences and uses a refined survey instrument to better isolate the factors of affective and cognitive engagement. An additional area of exploration may include gathering data on the impact and cohesiveness of the debriefing sessions in addition to the game sessions (Lacanienta 2022, 75).

Game-based learning can engage students in applications of academic skills and behaviors such as decision-making and problem-solving (Castillo-Parra et al. 2022, 811-813). In the undergraduate history course where we applied this strategy, the use of role-playing games created high levels of affective and cognitive engagement, primarily due to their active, interactive, and immersive characteristics that emphasized taking the perspectives of others and becoming "a part of the history I was learning about." As a complement to passive methods, game-based learning can help to rewrite students' internal rules for what a history course can be: "I learn best through collaboration and this gave me the chance amongst my peers to incorporate that into a history class, which I didn't think I would get."

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