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Towards Designing Technology for Classroom Role-Play

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ABSTRACT

Classroom role-play is an interactive learning technique with a long history of success, but current attempts to augment it with technology are implemented in ways that limit the interactions that make this technique successful. For example, digital role-play games often engage individual students at a computer, rather than creating rich social interactions among students. To design interactions that better support the core aspects of classroom role-play, we conducted interviews with teachers. We also interviewed role-play gamers to discover how traditional RPG techniques and technology can be used to enhance classroom role-play. The purposes of this study were to: (i) explore the reasons instructors choose role-play for learning, such as giving students practice opportunities; (ii) identify barriers to instructors using classroom role-play activities, such as time constraints and student discomfort; (iii) report issues around integrating technology, such as the benefit of reducing cognitive load and the threat of distraction; and (iv) highlight two areas where insights from role-playing games can support the design of effective interactive learning systems for classroom role-play, namely by providing methods for emphasizing group success over individual achievement and by preserving the spirit of the experience.

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1. INTRODUCTION

Role-play has been used in classrooms across a variety of disciplines to create opportunities for interactive learning (Amstrong, 2003; Lean *et al.*, 2006). While role-play activities vary across disciplines in terms of the number of participants, the modality of interaction, and feedback delivery (Amstrong, 2003; Othlinghaus-Wulhorst & Hoppe, 2020) the core activity involves collaborating with peers to generate knowledge. According to the interactive, constructive, active, and passive (ICAP spectrum) (Chi & Wylie, 2014), classroom roleplay activities would be interactive learning activities. Effective interactive learning activities must support learners in *generating* knowledge and in *collaborating* with peers. However, there are known challenges in each of these areas. For example, novice learners may not generate accurate or productive learning materials (Kourilsky, 1993) and may be hesitant to contribute to a collaboration (Horn & Little, 2010). Additionally, facilitating role-play activities requires expertise (Rao & Stupans, 2012) and there are few resources available for teachers to practice. Instructors have tried two strategies to solve these challenges: introducing *game rules* (Bowman & Ilieva, 2012; Cooper *et al.*, 2020) and using technology tools (Yen *et al.*, 2015). Game rules are typically modeled after digital role-playing games (RPG), while technology tools typically allow participants to role-play online, e.g. via Skype. When used individually, each of these strategies addresses some of the issues around classroom role-play. However, when game rules *and* technology tools are introduced at the same time, they do not always support the generative and collaborative elements that make classroom role-play effective. For example, students might be asked to pretend to be an ethnographer in *Everquest*, an MMORPG (Delwiche, 2006). While the student certainly learns about conducting social science research from the game, they are no longer interacting with their peers in real life. Additionally, this screen-based format excludes embodied forms of role-play.

Our goal in this paper is to explore how insights from roleplaying games can provide an alternate vision for designing supportive technology for classroom role-play activities, while still taking the constraints and challenges of the classroom setting into account. To understand the interaction between technology, role-playing, and the classroom context, we conducted 15 interviews with roleplay gamers who use digital tools to support their play practice, and with instructors who use technology or roleplay in the classroom. We used their insights to elicit design implications for systems to support classroom role-play as an interactive learning activity. Through these interviews, we explore reasons why instructors chose to use classroom role-play (rather than other pedagogical strategies), such as providing an opportunity to practice skills and giving students a “vicarious experience” (Bowman & Ilieva, 2012). We then identify barriers to instructors using classroom role-play activities, such as time constraints and student discomfort. Taken together, these motivations and barriers define opportunities for improving classroom role-play. Next, we report additional opportunities and constraints to be considered when supporting role-play with technology, such as the benefit of reducing cognitive load and the threat of distraction.

Finally, we highlight and discuss two areas where insights from role-playing games can support the design of effective interactive learning systems for classroom roleplay, namely by providing methods for emphasizing group success over individual achievement and by preserving the spirit of the experience.

2. THEORY

We review the literature on classroom role-play as an interactive learning activity, consider the challenges around designing and implementing classroom role-play, and examine existing solutions used to meet these challenges.

2.1. Classroom Role-Play

Many instructors have attempted role-playing activities as a strategy for bringing interactive learning into the classroom. In classroom role-playing activities, students take on the role of a character who exists in a fictional situation, using a set of rules to interact with other role-players and with the fictional situation (Lean *et al.*, 2006). For example, in language learning role-play, one student might take on the role of a shopper at a store, while another could play the clerk from whom they are trying to purchase something; rules for the scenario might include speaking exclusively in the target language or using specific vocabulary words.

Interactive role-play has a well-established history of being used and researched in disciplines such as geography, foreign languages, health studies, social work, religious studies, science, drama, education, psychology, social sciences, philosophy, English literature, environmental science and engineering, tourism and hospitality, ethics, economics, marketing, political science and information technology (Armstrong, 2003; Lean *et al.*, 2006). Across this broad range of domains, classroom role-play activities share certain core features, such as participants acting out the role of a character. The activities typically take place during class, which has a scheduled start and end time; everyone is in the classroom at the same time. However, there are also significant differences between role-playing activities as typically adopted in different learning domains. Critical axes of differences include the *number of participants*, the *modality of interaction*, and *feedback delivery*.

In language learning, classroom role-play activities are typically one-on-one and verbal, as with the shopper and clerk. Feedback typically happens infrequently and is only given by the instructor. In contrast, role-play in design classrooms is often a group activity in which students embody a user or other stakeholder during the activity and often give feedback to each other after the activity (Barab *et al.*, 2007; Othlinghaus-Wulhorst and Hoppe, 2020). For example, students might act out an exchange between a user and a service provider when designing a new service.

2.2. Wastewater and Industrial Water Purification Processes in The Station

In the ICAP framework (Chi & Wylie, 2014), interactive learning techniques ask students to generate novel learning-related materials and to collaborate in engaging with those ideas. Interactive learning techniques optimize student learning because they allow students to engage deeply in activities such as co-creation (Chi & Wylie, 2014). Classroom role-play activities at their best can embody these principles of interactive learning. When a student is portraying a character, the student's words or actions generate changes in the fictional situation in ways that depend on the rules of the activity in question. For example, in a role-play activity designed to teach climate change, students take on the role of a delegation from different countries to negotiate matters of geography, economy, and politics as they relate to climate change (Pachall & Wüstenhagen, 2012). Students participating in this activity must generate arguments and reasoning to advance the negotiations in their country's favor. They also collaborate with other students by reacting to the changes those students introduce to the shared fiction. For example, in the same climate change example, students might portray a government official, industry leader, or civil society member of their delegation. The

delegation members collaborate to form their positions, but they also collaborate with students from other delegation teams by negotiating with them (Pachall & Wüstenhagen, 2012).

While the generative and collaborative nature of role-play produces its strengths as an interactive learning activity, these strengths also introduce challenges. For example, because learners are not yet domain experts, the learning-related content they generate may not be accurate or productive. Without some method of feedback on their generated material, students may reinforce their misconceptions (Kourilsky, 1993). A second set of challenges has to do with the collaborative aspects of the activity. For example, varying levels of psychological ownership make it more difficult for students to respond meaningfully to each other's contributions as opposed to operating essentially independently (Horn & Little, 2010).

Teachers also face challenges around independently designing and facilitating high-quality interactive learning activities (Chi & Wylie, 2014). Teachers are not typically experts in roleplay; the ability to facilitate role-play activities is itself a skill (Rao & Stupans, 2012). Maintaining the collaborative and generative nature of the activity without special training or skills is difficult. Even if they have the expertise, designing roleplay activities is a time-consuming process (Pachall & Wüstenhagen, 2012).

2.3. Existing Approaches to Improving Classroom Role-play

Instructors commonly use two strategies to respond to these challenges: introducing *game rules* that help students participate effectively and introducing *technology tools* that keep the activity on track. However, when game rules *and* technology tools are introduced at the same time, they do not always support the generative and collaborative elements that make classroom role-play effective. When introducing *game rules* to classroom role-play activities, instructors typically build on analog role-playing games (RPG), including both tabletop and live-action play.

RPG methods can help support students in generating learning-relevant material and in reflecting on that material in ways that connect it to desired learning outcomes. For example, a Brazilian educator asked students to create an RPG based on a work of fiction, and use the game to encourage literary analysis and reflection (Gatsakou *et al.*, 2021). RPG methods can also structure student collaboration. For example, Turkington's live-action scenario *Against the Grain* has four players but only three chairs, giving certain characters a very literal seat at the negotiating table while someone must always be excluded (Mendes, 2019). Using RPG in education can offer a range of benefits (Bowman & Ilieva, 2012). However, integrating these benefits into classroom roleplay activities is not automatic. For example, Resnik & Wilensky designed role-play activities to help learners explore decentralized systems, but participants neither sustained the role of a character nor collaborated with other players during play (Gatsakou *et al.*, 2021). Additionally, existing RPGs often need to be adapted for the classroom environment. For example, the RPG *Ars Magica* directly engages with medieval history but is not designed to be played in the length of a class or at a classroom scale (Rese *et al.*, 2020). Finally, existing RPG may not address the specific topics that instructors hope to teach. Designing one's own RPG is difficult, particularly if it is meant to address a complicated subject or change players' attitudes (Pachall & Wüstenhagen, 2012; Slota *et al.*, 2013). While instructors who are expert role-players may be able to navigate these issues, most instructors are not trained in role-playing, nor are they expected to be. Existing strategies for incorporating *technology tools* into classroom role-play focus on using online communication technologies to perform traditional role-play activities. Bringing classroom role-playing activities online can have benefits for instructors and students. For example, conducting

language learning role-play over Skype can reduce student performance anxiety when generating contributions to the role-play activity (Yen *et al.*, 2015). Text-based roleplays can allow students to participate asynchronously and produce an artifact for instructors to review. However, these strategies are most useful for one-on-one, verbal roleplaying and do not support physical or tangible role-plays such as the ones often used in design classrooms. Additionally, some implementations (e.g. Skype roleplaying) make it more difficult to role-play in groups due to technological constraints. Finally, existing technology to support classroom role-play does not incorporate insights from RPG but simply allows current classroom role-play practices to be performed digitally. RPG techniques and technology are sometimes used in the classroom *together*, but often in ways that are not aligned with classroom role-play as an activity. For example, the gamified classroom is based on RPG elements such as levels, character statistics, and quests (Villalta *et al.*, 2021). However, the gamified classroom is meant to incentivize student participation in a range of activities rather than supporting classroom role-play (see **Table 1**). Digital RPG, including both single-player CRPG and multi-player MMORPG, have been used to teach a range of subjects including history and science (Bowman & Ilieva, 2012), and role-play activity within these technological forms can be beneficial for learning (Steinkuehler, 2006).

However, with digital RPG, students often interact with the simulated environment or with computer-controlled characters rather than generating novel material or interacting with one another. We seek to design technological systems that support classroom role-play as it is currently practiced, and that actively support the generative and collaborative interaction of classroom role-play activities. Our goal in this paper is to build on insights from role-playing games and from instructors who use classroom role-play to provide an alternate vision for designing supportive technology for classroom role-play activities.

Table 1. List of participants and relevant experience participants.

	Job and/or Experience
P1	Design professor
P2	Researcher
P3	Rpg designer
P4	Role player, sex-ed teacher
P5	University IT support, role player
P6	German professor
P7	Role player
P8	Computer science professor
P9	Chinese professor
P10	Improv professor
P11	University teacher support center
P12	Theater teacher
P13	Design professor
P14	Improv instructor
P15	Design professor

3. METHOD

To better understand how RPG could inform the design of interactive learning experiences, we conducted open-ended interviews with instructors and game players with a range of experience in RPG and classroom instruction. We sought to answer the following key research questions: what parallels exist between interactive learning environments and RPG, how can

the expertise of role-play gamers and instructors inform system designers, and what potential benefits and challenges emerge when technology is introduced to the activity?

Fifteen people participated in this study (9 male, 6 female). We recruited participants with experience in RPG and/or high school or college-level classroom instruction (see **Table 1**). We began by reaching out to professors at our university who used role-play in their classes, and by contacting colleagues who had experience with RPG. We then asked each participant to recommend others with relevant expertise, defined as those who had used role-play or in-class technology in a class they taught, those who had played RPG consistently as an adult, or those with work experience in a university technology support department. For participants with experience both as an instructor and as a role-playing gamer outside of an academic context, we separated their comments for analysis based on the specific experience they were describing at the time.

Interviews were conducted either in person or online using Google Hangouts and lasted 30-60 minutes. All interviews were video recorded. Participants were asked questions about their background and experience using role-play, specific examples of role-play activities they had participated in or used in a classroom, and how they had used technology during class or role-play.

All interviews were transcribed from the video recording. One researcher coded all reasoning about classroom activity design or game design into one or more of four categories: reasons to role-play, reasons not to role-play, reasons to use technology, and reasons not to use technology. Within each category, a team of three researchers iteratively sorted the quotes until patterns emerged using bottom-up coding.

4. RESULTS AND DISCUSSION

We asked participants to share what they felt were the benefits and challenges of role-play and the benefits and challenges of using technology either during class or during an RPG. Our qualitative analysis revealed a shared set of reasons to use or not use role-play, and a shared set of reasons to use or not use technology, despite the variety in participants' experiences. All the reasons from our data are listed in **Tables 2, 3, and 4**.

4.1. How Role-playing Can Support Interactive Learning

Table 2 lists the reasons participants gave for using role-play, which reflects a discussion of the benefits of interactive learning. For example, not only did all participants, including role-play gamers, identify learning as a key aspect of role-play activities, but they also recognized that interactivity was an essential aspect of role-play. Participants described co-creation activities provided by role-play, such as collaboratively participating in the creation of a shared reality (coded as shared fiction and freedom/play). Participants also recognized the importance of co-inferring and valued that other role-player impacted how they understood the role-play experience (coded as social interaction). From a learning perspective, participants saw role-play as providing opportunities to have experiences they otherwise might not have (vicarious experience), to practice skills in authentic contexts (practice), and to grow as human beings (personal growth). Instructors were concerned with innovation in the classroom (disrupt class), and role-players saw opportunities to form long-term relationships (investment and vulnerability). Building on these insights, we identify two aspects of interactive learning where insights from role-players can help instructors deepen the role-play activities they are already using.

4.1.1. Practicing and managing interactivity

Instructors used role-play activities as a chance for students to practice domain-specific skills interactively and, where possible, in an authentic context. For example, language instructors described role-play as “the only time the student can produce something using the things they have learned” (as it is done P9) and as a chance to “freely speak in a language” (as it is done by P6). Role-play provided a reason for students to produce language, and to interact with their peers, which precisely fits the criteria for interactive learning. These instructors faced few barriers in using role-play activities for interactive language practice. Role-play exercises were found in their textbooks, were standard procedures for other instructors they knew, and were designed to teach targeted lessons. This was not just the case for language instruction. For example, P4 used role-play activities in a sex education class to practice handling difficult sexual situations; these activities were a formal part of the curriculum.

Table 2. Reasons why study participants used role-play in classrooms or games.

Code	Explanation
Shared file	creating a story collaboratively through role-play
Vicarious experience	Experiencing something through role-play that one would not encounter under normal
Practice	Using role -play to practice a skill or learning goal
Social interaction	Connecting with others through role-play
Freedom/play	Exploring the limitless nature of role-play, role-play for the sake of enjoyment
Personal growth	Self-improvement as a result of role-play
Disrupt classroom	Using role-play to create a new, unusual classroom interaction
Investment	Dedication to the role-play story or group
Vulnerability	Discovering or expressing vulnerability through role-play

The majority of classroom role-play activities described by participants did not incorporate RPG elements, even when the instructor was also an expert role-player. However, RPG expertise sometimes helped instructors generate novel interactive learning experiences in domains without extensive formal support for role-play. For example, P5 described an instructor who adapted Emily Short’s game *San Tilapian Studies* (Montfort & Short, 2012) for an American History survey course. The game asks players to imagine artifacts that might be found in the museum of a fictional country, collaborate to find evidence of the artifact’s validity, and discuss what that evidence might mean for their imagined artifact. By changing the game materials to reference early American artifacts that the course was targeting, students were able to practice “thinking historically” and “historical interpretation” in an interactive way. Beyond adapting games to specific domains, role-players can also contribute deep expertise in organizing and managing interactivity. RPG provide structures for interaction that go beyond simple turn-taking or free-for-all participation, such as the rotating player roles in *Polaris* (Bowes-Lyon et al., 2010) and the bidding system in *Prime Time Adventures* (Davis, 1990). Role-players described interactive participation as a skill in its own right, which in turn can be supported by game rules. Instructors can adapt specific interactive organization systems of RPG for their role-play activities and help students practice interactive co-creation as a core skill.

4.1.2. Building and maintaining relationships

Instructors perceived role-play activities as useful for “warming up to the other people in the class” and serving as an “ice breaker” (as done by P1). Ice-breaking role-play activities might not convey domain-specific content, but could still help students comfortably participate in other learning activities. However, instructors did not prioritize the social interactions that occurred *during* role-play activities, even though these interactions are essential for interactive learning (Chi & Wylie, 2014). Role-players, on the other hand, saw RPG as ways to improve their social and communication skills.

Specific skills mentioned include reading emotions, making eye contact, teamwork, listening, empathy, awareness of others’ social signals, and treating others with respect. These skills were practiced by “interacting with another human being,” and experimenting with different behaviors using both “logical steps” and “emotional responses” as guides (as done by P4). Role-players recognized that communication skills are necessary first steps to engage in the conversations required for co-inference and collaboration. RPG also transformed players’ relationships with one another from individualistic to collective. For example, one participant described the core of improvisation as *“you are with other people, those people are the most important people on stage. Your job is to make them look brilliant”* (as said that P14). This participant prioritized shared brilliance over producing an individually brilliant performance. Role-players also emphasized the RPG group as a *“steady group of 4 or 5 people”* (as said by P4) that would form a social bond by coming together regularly to play the game. Role-players talked about the difficulty in finding new RPG groups after moving to a new city or using RPG as a way to develop new friendships. This emphasis on collective success can be educationally productive, particularly for deeper interactive learning activities like co-creation.

4.2. Challenges for Bringing Role-play into Classrooms

Participants gave fewer reasons for not using role-play than for any of the other categories. We did not separate these reasons into individual codes, but we discussed three themes that were commonly mentioned by participants.

4.2.1. Fitting the learning context

Participants remarked that some lessons or courses were not conducive to being taught with role-play activities. For example, both language instructors in our sample believed that role-play worked better in their beginning language classes than in advanced courses.

“In the advanced class, they are supposed to not only learn the language, but also the content itself. For some students, although they are okay with the language, they probably do not know the content. When they come up with a role-play, I just do not find it is satisfying from my point of view” (said P9).

While classroom role-play succeeds in helping students practice language skills, instructors believe it is less effective at teaching cultural topics that students are unfamiliar with. Practices from RPG could enhance classroom role-play activities, helping students develop awareness of and sensitivity to deeper cultural issues.

4.2.2. Overcoming time constraints

Two participants mentioned time as an inhibiting factor to using role-play in a classroom. Initially, a role-play activity requires an up-front effort to plan. *“I think the main constraint is time and planning a well-planned, coherent activity”* (said by P6). An instructor’s expertise

would influence how much time they needed to design, adapt, or implement a role-play activity. Role-play also takes time during the class session, which could discourage some instructors from attempting to use this technique. P1 said that *“particularly in large classrooms, there often was not time to see everyone’s role-play presentation”*.

4.2.3. Providing equal access for students with reservations

Finally, three participants mentioned that students or players often have reservations about role-play that can limit the success of such an activity. When commenting on tabletop RPG, P3 acknowledged that *“people’s comfort in an RP situation is not uniform.”* Similarly, in classroom roleplay, students *“feel lost because they have never done certain things before”* (as said by P6). *“They are nervous. I think that is the major barrier is they are still some of them uncomfortable, a bit shy with themselves”* (as said by P1).

4.3. How Technology Can Support Role-play in Classroom Settings

As we have seen, there are challenges to using role-play activities in the classroom, even when the instructor might find it educationally beneficial. However, our participants had insight into ways that technology could mitigate some of these concerns (see **Table 3**).

Table 3. Reasons why study participants used technology in classrooms or during role-play.

Code	Explanation
Shared experience	Using technology to share an experience with a large group of people
Reduce cognitive load	Using technology to make a task easier
Affordances of Technology	Taking advantage of specific functions or experiences that particular technology provides
Simulated Experience	Simulating an experience with technology that would be difficult to experience in real life
Record of play/class	Creating a digital record of what occurred during a game or class session

4.3.1. Dissemination of activities

While role-play activities might not fit all learning content, often the greatest barrier to implementing a role-play activity in class is the time required to create and plan the activity. Technology can help role-play activity designers disseminate activities to instructors for adaptation or adoption. For example, the instructor who adapted San Tilapian Studies for an American History course was able to do so because the rules are freely available online.

4.3.2. Reduce cognitive load

Instructors used technology to reduce the cognitive effort spent on resource management outside of class, such as data collection and efficient grading. *“The technology that supports a large class is aimed at efforts to help the instructor manage more efficiently, so grading”* (as said by P11). Instructors did not use technology to encourage or enhance student interaction, or to lower their cognitive load *during* class when interactions might occur. Role-players, on the other hand, were focused on lowering the cognitive load spent on non-interactive elements of the game during play, to allow more interaction to occur. In some games, players might need to be simultaneously attending to die rolls (as said by P2), map placement of characters (as said by P5), verbal narration and time (as said by P13), and complex mathematical calculations (as it said by P15) to figure out their next move. By using technology to keep track of game elements, as well as to create additional screen real estate

during online games (as said by P5), players were able to keep track of the game without a large cognitive burden. Players also used tablets and other technology to reference game rules (as it said by P13 and P5), historical facts (as it said by P15), or other relevant information (as it said by P7) in real-time. This freed players from having to remember all the rules of a complex game and allowed them to focus on the more important aspects of play – the interactions among players. Technology that supports student interactions during classroom role-play can help make implementing interactive learning activities more feasible for instructors.

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4.3.3. Record of Play/Class

Instructors often use technology to provide students with a record or model of expert behavior. For example, P8 said, *“I always have Python open, and I write lots of code while I lecture.”* The code written by the instructor during a lecture is available to students after class. Instructors also used technology to provide students with another way to participate in class. One instructor supported ESL students by telling them *“If you do not feel like you can participate verbally in class, you can participate by writing”* down their observations and emailing the instructor (as said by P15). In one tabletop role-playing game, the players created an in-game wiki to detail “people that we met”, “things that happened to this character when we were not around”, and to “signal the people running the game” of their preferred storylines (as it said by P15). Both instructors and role-players used the records of the experience to promote equal access to the game or class session. Those who may have felt reservations about fully participating in role play or class were allowed to interact with the record of the activity in a less threatening, lower-risk way.

4.4. Challenges of Using Technology

Both instructors and role-players described ways that technology could help them improve their role-playing (see **Table 4**). However, both groups also identified new challenges that technology introduced.

Table 4. Reasons why study participants did not use technology in classrooms or during role-play.

Code	Explanation
Negative attention	When technology use causes a distraction or division of attention or when the distraction has a negative effect on the culture of the environment
Diminishing the experience	When technology uses detracts from the overall experience in ways other than causing a distraction or division of attention
Functional problems	When the technology breaks down, or when users expect the technology to break down
Logical barriers	Overhead or logistical issues that make implementing technology difficult

4.4.1. Functional and logistical problems

Instructors were highly concerned with technology failing, citing experiences with technology that was “buggy” (as said by P6), had “technical issues” (as said by P13), or had

“bandwidth problems” (as said by P5). They had strong beliefs that *“they are going to break down at some point”* (as said by P11). Even technology that did not break down generated logistical problems, like teaching students how to use new software (as said by P8) and students forgetting to bring clickers to class (as said in P11). Several instructors described selecting low-tech learning activities specifically to avoid *“the different things that could go wrong”* (as said by P6). By contrast, role-players saw technology primarily as an opportunity – even when describing technology going astray. For example, P5 described a game in which players tried to use Twitter to emulate the high school rumor mill. The game managers realized Twitter was too public a venue for this record of play. *“The majority was not comfortable using their actual Twitter accounts for that traffic”* (as said by P5). P5 approvingly described how the group adopted a different solution and remained interested in using Twitter in play.

4.4.2. Technology as a distraction

Instructors saw students using digital devices as reducing their attention to the course material. These concerns were often framed dramatically, for example as *“their brains getting sucked out of their heads”* (as said by P8). Instructors were also concerned about the distracting effects on other students. When one student becomes distracted by technology, *“three or four heads around them go down on their phones”* (as said by P8). Role-players’ concerns centered on preserving a shared experience. Technology might “break the illusion” of the shared imaginary world (as said by P2) or *“take the emotion out of it”* (as said by P3). Even positive interactions with technology – e.g. simplifying interactions with rules – could be understood as “checking out” of the communal experience (as said by P5). However, role-players saw the problem of distraction as one that could be mitigated with social agreements. For example, P5 identified specific situations where technology would be particularly damaging: *“if there are costumes involved, if there are real spaces involved.”* In these situations, P5 said, *“very, very rarely brought out any type of device.”*

4.5. Discussion

Our findings illuminate the reasons why instructors use role-play activities in the classroom and allow us to identify two areas where insights from RPG can support the design of effective interactive learning systems. We offer concrete suggestions for using RPG techniques to implement these suggestions.

4.5.1. Support group cohesion

For co-inferring and co-creation to occur, students need to interact in productive and meaningful ways. The interaction itself is the cause of learning. However, instructors often focus on individual learner’s performance, rather than on the progress of the class as a whole. While students participate in the role-play interactively, the focus is on improving a student’s performance. In contrast, role-players primarily see RPG from a group perspective. Whether that means finding the right people to play with or helping fellow role-players become valued contributors, role-players’ concerns focus on the interactions among team members.

This difference also manifests in the way instructors and role-players talk about technology. When instructors talked about technologies to lower cognitive load, they described possible benefits for *themselves as instructors* (e.g. efficient grading) and for *individual students* (e.g. increasing accessibility for ESL learners). Role-players, on the other hand, wanted to make game tasks easier to benefit everyone. For example, in a game with complicated rules about sharing resources, one player created a spreadsheet to track what

the group had access to (as stated by P15). By replacing complicated calculations with a single number, this player reduced wait times for the entire group and allowed them to spend more time interacting. Focusing more on group cohesion during classroom role-play could help encourage interactive learning. Many educational settings involve sustained group work, particularly for project-based learning (Kokotsaki et al., 2016). The quality of a team affects how much participants learn (Ku et al., 2013).

However, creating a cohesive team is complex and takes time; before teams can perform at a high level, they must establish shared goals, resolve interpersonal conflicts, and take full responsibility for their shared work (Tuckman, 1964). The RPG literature offers three concrete ways to support group cohesion that can be adapted to interactive learning systems. First, RPG give participants the power to affect a single, shared, imaginary world (Montola et al., 2008). When players have to come to a consensus about the shared imaginary space, they must respect or at least acknowledge one another's conclusions. Interactive learning systems can encourage students to reach a consensus during their interactions and provide support for both expressing opinions and resolving disagreements. Second, RPG have developed many different systems for managing multiple people's contributions to a single shared imaginative space (Rese et al., 2020). One common approach is to give each person's character different necessary skills, and divide up power such that every player has limited ability to make decisions.

This requires and provokes contributions from everyone that build on other people's contributions. Contribution management options can be incorporated into an interactive learning system. Third, in RPG players have to agree that their characters should stay together during the story (Rese et al., 2020). Game participants are explicitly putting characters in relationships with one another, which helps people see why they might engage rather than withdraw. Interactive learning systems can draw attention to relationships among students and students' characters in a classroom role-play activity. By drawing on role-players' insights about group-first RPG, classroom role-play activities can be designed to create cohesive groups for learning – and they can utilize technologies that help role-play activities support groups, not just individuals.

4.5.2. Preserve the spirit of the experience

One concern raised by role-players - a concern that instructors did not share - was that technology might damage the "spirit of the game." By this, role-players mean a set of norms and expectations that allow players to feel comfortable, playful, and invested in participating. Role-players consider this to be a framework or scaffold that supports and encourages player interaction. Role players perceive this state as fragile, requiring attention and care from all players to maintain. Instructors, on the other hand, did not talk about creating a classroom culture to support interactive, participatory learning, even if the instructor had experience with role-play.

Again, this difference manifested in the participants' approach to technology. Both role-players and instructors talked about using technology to record their activities. However, they had very different purposes for recording. Role-players wanted to use recordings to re-enter the imaginative space of the game, such as by using a wiki to remind them what happened in the game (as said by P15). In designing recording methods, they carefully thought through how the recording and retrieval process would make players feel and if it would encourage or discourage interaction (as said by P5). Instructors, on the other hand, saw recording as a way of capturing expert behavior for students to reference. For example, P8 wanted to use recording to model code design, while P1 wanted to model how to give helpful feedback.

Although role-players and instructors saw similar reasons to role-play, they focused on capturing different aspects of the experience.

This difference also informed participants' ideas about recording and privacy. Role-players, who expect to share their game experience only with those they have chosen, were concerned about intrusiveness and privacy. When talking about recording, they were interested not just in how the record was captured, but also in how it was displayed and shared after its creation. For example, in the Twitter game described previously, the game managers used "big sticky post-it notes on the wall, that people would just write on with their fake Twitter handles" instead of requiring people to post publicly on their real Twitter account (as stated by P5). Instructors, on the other hand, expressed no concern for whether or not students considered records intrusive, and had no qualms about sharing records with researchers outside the classroom – perhaps because the classroom context by default involves sharing with relative strangers. Affect matters in learning environments, as do shared norms such as attitudes to failure (Amoako-Gyampah & Salam, 2004) and we believe that many instructors are already aware of this. However, instructors in our sample did not identify role-play as a way to construct and maintain shared norms, or as a way to affect learners emotionally. This belief was also reflected in their attitudes toward technology. RPG literature offers two concrete ways to preserve the spirit of the experience. Some role-playing games use rituals to establish the boundaries of play and model the desired experience during the game. For example, Polaris asks players to begin the game by speaking a key phrase. "Long ago, the people were dying at the end of the world." The game text also suggests other ritual elements to add, such as lighting a candle or playing a piece of music to evoke feelings of loss and grief (Bowes-Lyon *et al.*, 2010). Second, token systems such as those used in The Quiet Year (Heidbrink *et al.*, 2014) can encourage players not just to follow game rules, but also to express their emotions in a way that promotes the spirit of the game.

These insights present an opportunity to increase instructors' sensitivity to the experiential qualities of role-play activities and help instructors use supportive technology more effectively, such as considering the context and intrusiveness of classroom recordings and how students might feel both about reviewing them and about having the recordings exposed to others.

4.5.3. Implications for system design

It is important to support classroom role-play before, during, and after the role-play activity. Instructors described challenges around planning and preparing for role-play activities; facilitating and monitoring play; and reviewing and providing feedback after the role-playing finished. Role-players also see preparation for play (e.g. constructing game artifacts) and after-play activities (e.g. discussing what happened in the game) as critical for the group dynamics and the construction of a shared experience. Systems for classroom role-play, therefore, can begin with methods for guiding instructors in creating and finding activities. During the role-play activity, systems might provide better real-time monitoring and feedback capacity, particularly in ambient or subtle ways that do not disrupt the spirit of the experience. After the role-play activity, systems might share back a record of the activity for asynchronous participation by less-engaged students or for experts to provide feedback. Other ways of supporting students might involve reducing performance anxiety, scaling the number of students who can participate actively in a given role-play, and reducing their cognitive load when interacting with the rules (rather than the learning content) of the classroom role-play activity. The obvious stakeholders are the instructor and the student, but

our findings suggest that systems also need to support the group, which might include only students or might include students and instructors role-playing together.

Systems for classroom role-playing in groups need to support group decision-making, information exchange, evaluation of group rather than individual outcomes, and group meaning-making. They also need to capture data for presentation to the instructor that is relevant to the group and not only at the individual level. Before the role-play activity, group-based systems can support the development of group identity and group construction of what a shared experience might look like. After role-playing, group-based systems might support debriefing and reflection on the shared activity within the group itself, as well as feedback exchange between role-playing groups.

5. CONCLUSION

We conducted an interview study with 15 participants with a range of experience with role-playing and classroom instruction to understand if and how role-play might inform interactive learning systems. We found that role-players have insights about supporting group cohesion and preserving the spirit of the experience that could positively impact how interactive learning is implemented. We also examined how role-play gamers' perspectives on technology can help address many of the challenges of using role-play during class. These insights connecting interactive learning and RPG can benefit both communities as it is explored further.

6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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