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 limit the very 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. In order 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. In this paper we 1) explore the reasons instructors choose role-play for learning, such as giving students practice opportunities; 2) identify barriers to instructors using classroom role-play activities, such as time constraints and student discomfort; 3) report issues around integrating technology, such as the benefit of reducing cognitive load and the threat of distraction; and 4) highlight two areas where insights from role-playing games can inform the design of interactive learning systems for classroom role-play: by providing methods for emphasizing *group success* over individual achievement and by preserving the *spirit of the experience*.

Author Keywords
Role-play games; classroom role-play activities; interactive learning; educational technology design.

ACM Classification Keywords
K.3.1 Computer Uses in Education: Collaborative learning.

INTRODUCTION
Role-play has been used in classrooms across a variety of disciplines to create opportunities for interactive learning [2,14]. While role-play activities vary across disciplines in terms of numbers of participants, the modality of interaction, and feedback delivery [2,22], the core activity involves collaborating with peers to generate knowledge. According to the ICAP spectrum (interactive, constructive, active, passive) introduced by Chi et al. [6], classroom role-play activities would be an interactive learning activity.

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 [12], and may be hesitant to contribute to a collaboration [4]. Additionally, facilitating role-play activities requires expertise [3] and there are few resources available for teachers to practice.

Instructors have tried two strategies to solve these challenges: introducing *game rules* [10,18] and using *technology tools* [28]. Game rules are often modeled after analog role-playing games (RPGs), 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 [7]. 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 role-playing 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 role-play gamers who use digital tools to support their play practice, and with instructors who use technology or role-play 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 1) 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" [10]. We then 2) identify barriers to instructors using classroom role-play activities, such as time constraints and student discomfort. Taken together, these

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motivations and barriers define opportunities for improving classroom role-play. Next, we 3) 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 4) highlight and discuss 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*.

RELATED WORK

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.

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 [14]. 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 [2,14]. 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 difference 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 [5,22]. For example, students might act out an exchange between a user and a service provider when designing a new service.

Challenges of interactive learning activities

In the ICAP framework introduced by Chi et al [6], 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 [6].

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 [17]. 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 with each other to form their position, but they also collaborate with students from other delegation teams by negotiating with them [17].

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 own misconceptions [12]. 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 [4].

Teachers also face challenges around independently designing and facilitating high-quality interactive learning activities [6]. Teachers are not typically experts in role-play; facilitating role-play activities is itself a skill [3]. Maintaining the collaborative and generative nature of the activity without special training or skills is difficult. Even if they have the expertise, designing role-play activities is a time-consuming process [17].

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 (RPGs), 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 [11]. 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 [26].

Using RPGs in education can offer a range of benefits [10]. However, integrating these benefits into classroom role-play 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 [11]. 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 classroom scale [9]. Finally, existing RPGs may not address the specific topics that instructors hope to teach. To design one's own RPG is difficult, particularly if it is meant to address a complicated subject or change players' attitudes [17,23]. 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 [28]. Text-based role-plays 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 role-playing and do not support physical or tangible role-plays such as the ones often used in design classrooms. Additionally, some implementations (e.g. Skype role-playing) 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 RPGs, 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 [20]. However, the gamified classroom is meant to incentivize student participation in a range of activities rather than supporting classroom role-play. Digital RPGs, including both single-player CRPGs and multi-player MMORPGs, have been used to teach a range of subjects including history and science [10], and role-play activity within these technological forms can be beneficial for learning [24]. However, with digital RPGs, 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.

METHODS

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

#	Job and/or Experience	Education?	RPG?
P1	Design Professor, Improv Actor	X	X
P2	Role Play Researcher		X
P3	RPG Designer		X
P4	Role Player, Sex-Ed Teacher	X	X
P5	University IT Support, Role Player	X	X
P6	German Professor, Role Player	X	X
P7	Role Player		X
P8	Computer Science Professor	X	
P9	Chinese Professor	X	
P10	Improv Professor	X	X
P11	University Teacher Support Center	X	
P12	Theater Teacher	X	X
P13	Design Professor, Role Player	X	X
P14	Improv Instructor	X	X
P15	Design Professor, RPG Designer	X	X

Table 1: List of participants and relevant experience

potential benefits and challenges emerge when technology is introduced to the activity?

Participants

Fifteen people participated in this study (9 male, 6 female). We recruited participants with experience in RPGs 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 RPGs. 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 RPGs 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-play gamer outside of an academic context, we separated their comments for analysis based on the specific experience they were describing at the time.

Procedure

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 during role-play. We asked participants to share what they felt were the benefits and challenges of role-play, and the benefits and challenges to using technology either during class or during an RPG.

Analysis

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.

FINDINGS

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, & 4.

How Role-Playing can Support Interactive Learning

Table 2 lists the reasons participants gave for using role-play, which reflect Chi & Wylie's 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-players 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 (*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.

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 really produce something using the things they have learned" (P9) and as a chance to "freely speak in a

Code	Explanation
Shared Fiction	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

Table 2: Reasons Why Study Participants Used Role-Play in Classrooms or in Games

language" (P6). Role-play provided a reason for students to *produce* language, and to *interact* with their peers, which precisely fits Chi & Wiley's 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 procedure 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.

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* [21] 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. RPGs provide structures for interaction that go beyond simple turn-taking or free-for-all participation, such as the rotating player roles in *Polaris* [15] and the bidding system in *Prime Time Adventures* [27]. Role-players described interactive participation as a skill in its own right, which in turn can be supported by game rules. Instructors can both adapt specific interactive organization systems of RPGs for their own role-play activities and help students practice interactive co-creation as a core skill.

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" (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 [6]. Role-players, on the other hand, saw RPGs 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 (P4). Role-players recognized that communication skills are necessary first steps to engage in the conversations required for co-inference and collaboration.

RPGs 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" (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" (P4) that would form a social bond by coming together on a regular basis to play the game. Role-players talked about the difficulty in finding new RPG groups after moving to a new city, or using RPGs 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.

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 discuss three themes that were commonly mentioned by participants.

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 don't know the content. [...] so when they come up with a role-play, I just don't find it is really satisfying from my point of view" (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 RPGs could enhance classroom role-play activities, helping students develop awareness of and sensitivity to deeper cultural issues.

Overcoming Time Constraints

Two participants mentioned time as an inhibiting factor to using role-play in a classroom. Initially, a role-play activity requires up-front effort to plan. "I think the main constraint is time and planning a well-planned, coherent activity" (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.

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

Table 3: Reasons Why Study Participants Used Technology in Classrooms or during Role-Play

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 RPGs, P3 acknowledged that "people's comfort in a RP situation isn't uniform." Similarly, in classroom role-play, students "feel lost because they have never done certain things before" (P6). "They are nervous. I think that is actually the major barrier is they are still some of them uncomfortable, a bit shy with themselves" (P1).

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). We discuss three examples.

Affordances of Technology: 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.

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 really aimed at efforts to help the instructor manage more efficiently, so grading" (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 (P2), map placement of characters (P5), verbal narration and time (P13), and complex mathematical calculations (P15) in order 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 (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 (P13, P5), historical facts (P15), or other relevant information (P7) in real time. This freed players from having to remember all the rules to 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.

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 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 (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 weren't around", and to "signal the people running the game" of their preferred storylines (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 given an opportunity to interact with the record of the activity in a less threatening, lower-risk way.

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.

Functional and Logistical Problems

Instructors were highly concerned with technology failing, citing experiences with technology that was "buggy" (P6), had "technical issues" (P13), or had "bandwidth problems" (P5). They had strong beliefs that "they're going to break down at some point" (P11). Even technology that didn't break down generated logistical problems, like teaching students how to use new software (P8) and students

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 use 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
Logistical Barriers	overhead or logistical issues that make implementing technology difficult

Table 4: Reasons Why Study Participants Did Not Use Technology in Classrooms or during Role-Play

forgetting to bring clickers to class (P11). Several instructors described selecting low-tech learning activities specifically to avoid "the different things that could go wrong" (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 wasn't really comfortable using their actual Twitter accounts for that traffic" (P5). P5 approvingly described how the group adopted a different solution, and remained interested in using Twitter in play.

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" (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" (P8). Role-players' concerns centered on preserving a shared experience. Technology might "break the illusion" of the shared imaginary world (P2) or "take the emotion out of it" (P3). Even positive interactions with technology – e.g. simplifying interactions with rules – could be understood as "checking out" of the communal experience (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's costumes involved, if there's real spaces involved." In these situations, P5 "very, very rarely brought out any type of device."

DISCUSSION: IMPLICATIONS FOR INTERACTIVE LEARNING

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

Support Group Cohesion

In order 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 individual performance. In contrast, role-players primarily see RPGs 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 (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 (e.g. [8]). The quality of a team affects how much participants learn [13]. 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 [25].

The RPG literature offers three concrete ways to support group cohesion that can be adapted to interactive learning systems. First, RPGs give participants the power to affect a single, shared, imaginary world [16]. 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 consensus during their interactions and

provide support for both expressing opinions and resolving disagreements. Second, RPGs have developed many different systems for managing multiple people's contributions to a single shared imaginative space [9]. 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 RPGs players have to agree that their characters should stay together during the story [9]. Game participants are explicitly putting characters in relationship to one another, which helps people see why they might engage rather than withdraw. Interactive learning systems can draw attention to relationships among students and among students' characters in a classroom role-play activity. By drawing on role-players' insights about group-first RPGs, 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.

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 participants' approach to technology. Both role-players and instructors talked about using technology for recording 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 (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 (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 (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 [29], 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.

The RPG literature offers two concrete ways to preserve the spirit of the experience. Some role-playing games use ritual 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 [15]. Second, token systems such as those used in *The Quiet Year* [1] can encourage players not just to follow games 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.

Classroom Context and Content

Classroom differences can affect the design of role-play and/or technology interventions. For example, different domains may value certain benefits of role-play more than others. Social interaction might be particularly important for language learning as students practice language skills with each other, while vicarious experience might be more important in the design classroom because it helps learners take on the perspective of stakeholders.

Class size also has an impact, just as role-play game design differs at different scales. For example, tabletop games are typically designed for small groups (usually 3-8 players), while some live-action games can accommodate up to several thousand. Classes at different scales would be implementing games that draw on different design communities and different design principles. Some large

classes might choose to break into small groups, while others might choose to stay together. This decision could be affected by the physical classroom layout, such as a lecture hall with fixed seating that does not allow students to split into groups, as well as by the instructor's learning goals.

Other factors such as access to technology, students' prior experiences, and instructor training with technology or role-play could also affect how technology and RPGs impact a classroom environment. Students enter a class with different kinds of literacy. They might have strong technical literacy and easy access to technology; strong game literacy and knowledge about a wide variety of genres and game mechanics; and/or strong role-play literacy that enables them to embody a character during improv. These prior experiences could impact the choices an instructor makes when bringing technology and role-play into a class. For example, in a class where students are technically literate but not role-play literate, an instructor might choose a game with a strong technology component that would support their burgeoning role-play skills. These and other factors of classroom context can be explored in future work.

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 at 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.

Limitations

Our study included a limited number of participants and relied primarily on interviews. We chose to conduct interviews because we wanted to understand participants' experiences with multiple open-ended domains. However, this method is limited by the particular experiences of the participants in our study and the constrained amount of time we could spend with each interviewee. Our instructor interviews did not cover the full range of disciplines in which teachers use role-play in class, such as simulations used in medical training and education.

FUTURE WORK

We chose to only conduct interviews in our initial exploration of this research space. In future studies, we would use additional methods to gather more comprehensive data. Future studies could conduct observations of role-play in different settings to collect behavioral data that can further inform system design. Future studies could draw from principles of body storming [19], where designers role-play to design for people, which could also provide design guidelines for systems supporting role-play games.

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 RPGs can benefit both communities as it is explored further.

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REFERENCES

1. Avery Alder. 2013. The Quiet Year. Retrieved from http://buriedwithoutceremony.com/the-quiet-year/
2. EK Armstrong. 2003. Applications of role-playing in tourism management teaching: An evaluation of a learning method. *Journal of Hospitality, Leisure, Sport and Tourism* …. Retrieved March 19, 2016

from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.603.1204&rep=rep1&type=pdf

3. Allan Baumer and Brian Magerko. 2009. Narrative development in improvisational theatre. *Joint International Conference on Interactive Digital Storytelling*: 140–151. Retrieved April 14, 2017 from http://link.springer.com/chapter/10.1007/978-3-642-10643-9_19
4. Ina Blau and Avner Caspi. 2009. What type of collaboration helps? Psychological ownership, perceived learning and outcome quality of collaboration using Google Docs. *Proceedings of the Chais conference on instructional technologies research*. Retrieved February 6, 2017 from http://telem-pub.openu.ac.il/users/chais/2009/noon/1_1.pdf
5. Marion Buchenau and Jane Fulton Suri. 2000. Experience prototyping. *Proceedings of the conference on Designing interactive systems processes, practices, methods, and techniques - DIS '00*, ACM Press, 424–433. http://doi.org/10.1145/347642.347802
6. MTH Chi and R Wylie. 2014. The ICAP framework: Linking cognitive engagement to active learning outcomes. *Educational Psychologist*. Retrieved March 19, 2016 from http://www.tandfonline.com/doi/abs/10.1080/00461520.2014.965823
7. A Delwiche. 2006. Massively multiplayer online games (MMOs) in the new media classroom. Retrieved September 16, 2014 from http://scholar.google.com/scholar?cluster=5832740351102013769&hl=en&oi=scholarr#0
8. Matthew W. Easterday, Daniel Rees Lewis, Colin Fitzpatrick, and Elizabeth M. Gerber. 2014. Computer supported novice group critique. *Proceedings of the 2014 conference on Designing interactive systems - DIS '14*, ACM Press, 405–414. http://doi.org/10.1145/2598510.2600889
9. Jessica Hammer and Kaitlin Heller. 2012. Playing History: How Ars Magica Players Develop Historical Literacy. *Meaningful Play*. Retrieved October 29, 2016 from http://meaningfulplay.msu.edu/proceedings2012/mp2012_submission_7.pdf
10. Jessica Hammer, Alexandra To, K. Schrier, S. Bowman, and Geoff Kaufman. Role-playing Games and Learning. In *The Handbook of RPG Studies*.
11. Carlos Klimick, Eliane Bettocchi, and Rian Rezende. 2016. The Incorporeal Project: Teaching through Tabletop RPGs in Brazil. *Analog Game Studies*.
12. Marilyn Kourilsky. 1993. Economic Education and a Generative Model of Mislearning and Recovery. *The Journal of Economic Education* 24, 1: 23–33. http://doi.org/10.1080/00220485.1993.10844776
13. Heng-Yu Ku, Hung Wei Tseng, and Chatchada Akarasriworn. 2013. Collaboration factors, teamwork satisfaction, and student attitudes toward online collaborative learning. *Computers in Human Behavior* 29, 3: 922–929. http://doi.org/10.1016/j.chb.2012.12.019
14. J. Lean, J. Moizer, M. Towler, and C. Abbey. 2006. Simulations and games: Use and barriers in higher education. *Active Learning in Higher Education* 7, 3: 227–242. http://doi.org/10.1177/1469787406069056
15. Ben Lehman. 2011. These are our games: Polaris. Retrieved March 25, 2016 from http://www.tao-games.com/polaris/
16. M Montola. 2009. The invisible rules of role-playing: the social framework of role-playing process. *International journal of role-playing*. Retrieved November 7, 2016 from http://www.ijrp.subcultures.nl/wp-content/uploads/2009/01/montola_the_invisible_rules_of_role_playing.pdf
17. Melissa Paschall and Rolf Wüstenhagen. 2012. More than a game: Learning about climate change through role-play. *Journal of Management Education* 36, 4: 510–543. Retrieved April 14, 2017 from http://journals.sagepub.com/doi/abs/10.1177/1052562911411156
18. Mike Pearl. At This Danish School, LARPing Is the Future of Education. *VICE*. Retrieved March 1, 2016 from http://www.vice.com/read/at-this-danish-school-larping-is-the-future-of-education-482
19. Dennis Schleicher, Peter Jones, and Oksana Kachur. 2010. Bodystorming as embodied designing. *interactions* 17, 6: 47. http://doi.org/10.1145/1865245.1865256
20. Lee Sheldon. 2011. *The Multiplayer Classroom: Designing Coursework as a Game*. Cengage Learning. Retrieved March 1, 2016 from https://books.google.com/books?hl=en&lr=&id=qYMLAAAAQBAJ&pgis=1
21. Emily Short. 2012. San Tilapian Studies (a casual narrative entertainment for 30-40 players). *Wordpress*. Retrieved March 24, 2016 from https://emshort.wordpress.com/2012/08/30/san-tilapian-studies-a-casual-narrative-entertainment-for-30-40-players/

22. Kristian T. Simsarian. 2003. Take it to the next stage: the roles of role playing in the design process. *CHI '03 extended abstracts on Human factors in computing systems - CHI '03*, ACM Press, 1012–1013. http://doi.org/10.1145/765891.766123

23. Stephen Slota, Kevin Ballestrini, and Mark Pearsall. 2013. Learning Through Operation LAPIS— A Game-Based Approach to the Language Classroom. *The Language Educator*, 36–38. Retrieved from http://practomime.com/pdf/tle_art.pdf

24. Constance Steinkuehler. 2006. The Mangle of Play. *Games and Culture* 1, 3: 199–213. Retrieved April 14, 2017 from http://journals.sagepub.com/doi/abs/10.1177/1555412006290440

25. BW Tuckman. 1964. Personality structure, group composition, and group functioning. *Sociometry*. Retrieved March 24, 2016 from http://www.jstor.org/stable/2785659

26. Moyra Turkington. 2016. War Birds. Game.

27. Matt Wilson. 2004. Primetime Adventures | Dog Eared Designs. Retrieved March 25, 2016 from http://www.dog-eared-designs.com/primetime-adventures/

28. Yen-Chen Yen, Huei-Tse Hou, and Kuo En Chang. 2015. Applying role-playing strategy to enhance learners' writing and speaking skills in EFL courses using Facebook and Skype as learning tools: a case study in Taiwan. *Computer Assisted Language Learning* 28, 5: 383–406. http://doi.org/10.1080/09588221.2013.839568

29. JE Zins. 2004. *Building academic success on social and emotional learning: What does the research say?* Retrieved March 24, 2016 from https://books.google.com/books?hl=en&lr=&id=MuDGDHCb_iwC&oi=fnd&pg=PR7&dq=student+emotion+learning&ots=oGcyn8OEA_&sig=nMY95f5g-BkM1DW7up9Hplq1aHo