Exploring Authenticity and Playfulness in Teacher Practice Spaces

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Abstract: Teacher practice spaces are learning experiences, inspired by games and simulations, that allow novice teachers to rehearse for and reflect on important decisions in teaching. Practice-based teacher educators use various approaches to simulation in methods courses, and these simulations often attempt to holistically replicate the complexity of teaching conditions. In this research, we present a range of practice spaces that do not attempt to replicate teaching but explore design spaces with varying levels of authenticity. We define 4 dimensions of authenticity in teaching simulations: authenticity of complexity, of situation, of role, and of task. We discuss how these dimensions of authenticity intersect with playfulness in the examination of 4 case studies of teacher practice spaces. We hypothesize that authenticity of task is essential to most teacher practice spaces, but interesting new design spaces can be found by moving away from other dimensions of authenticity.

Introduction

Every great teacher knows that skill development requires practice (Ball & Forzani, 2009); ironically, teachers themselves have limited opportunities to practice important teaching moves in low-stakes settings. In a comparative study of teachers, social workers, and therapists, Grossman and colleagues (2009) conclude that "prospective teachers have fewer opportunities to engage in approximations that focus on contingent, interactive practice than do novices in the other two [helping] professions." Currently, novice teachers primarily learn in two types of spaces: Socratic seminar rooms in teacher-education programs (or lecture-heavy workshops for in-service professional development) and practicum classrooms. The former affords discussion and the latter affords immersion into the challenges of teaching, but a third space—a practice space—is needed that combines an authentic experience of teaching with carefully designed scaffolds that support the development of teachers' skills and identity. In our research, we design teacher practice spaces, inspired by games and simulations, that allow teachers to rehearse for and reflect upon important decisions in teaching.

The word *practice* takes on multiple meanings in teacher education—practices are the set of activities that teachers employ in their work and practice is the rehearsal and preparation required to expertly deploy those activities in classrooms (Lampert, 2010; Schön, 1987). The last decade has seen tremendously productive design research into this line of inquiry. For instance, Kazemi, Franke, and Lampert (2009) define a cycle of enactment in which teacher candidates participate in lessons with particular instructional activities as students, and then candidates analyze the lesson, identify strengths and alternative pathways, prepare a plan for teaching with the protocol, and then take turns rehearsing their lesson with other candidates acting as students. The Sposato School of Education promotes similar cycles of scripting instructional moves, practicing in simulations with colleagues, and then receiving coaching from peers and mentors. Field-mediated experiences are another innovative approach to practice, where entire methods classes visit the classrooms of cooperating teachers for immersive coaching experiences with small groups of K–12 students (Horn & Campbell, 2015).

In addition to the program- or course-level practice-based curriculum design, researchers have created

stand-alone simulations that aim to replicate the complexity of real moments of teaching. For instance, Mursion is a mixed-reality medium in which teachers practice in front of a computer monitor with a series of student avatars (Mursion, 2017). The student avatars are controlled as "digital puppets" by a remote actor who can see and hear the teacher through networked video cameras. Dotger (2013) designs clinical simulations, adapted from medical education, for preservice students. Teacher-learners interact with in-person actors who are trained with the background story and motivations of a parent, student, or colleague with some particular problem or dilemma. Through preparation, role-play, individual reflection, and peer discussion, novice teachers rehearse for challenging situations in low-stakes settings. Self (2016) has adapted Dotger's model to address issues of culturally responsive teaching. Research into pedagogies of enactment shows promising results in helping novice teachers be prepared with specific techniques and strategies as they begin classroom teaching.

We observe that most efforts at practice in teacher education aim to approximate as completely as possible the experience of classroom teaching. To borrow an analogy from sports, most of these simulations are like "scrimmages," which are close analogues to the complete game. We believe that interesting design spaces can be found by exploring what "drills" for teacher education might look like, where we engage teacher-learners in nonteaching activities that help them develop skills and dispositions that are useful for teaching. When training young violinists, music teachers often use bow games: silly songs where violin learners sing and vigorously wave their bow with specific motions while maintaining the correct grip on the bow handle. Young soccer athletes play games such as keep-away to develop ball-handling skills. A violinist will never wave her bow maniacally above her head in a recital, and a soccer player will never play keep-away during a match, but these drills isolate particular skills for development that are then reintegrated—ideally with greater competency—into the complex assemblage of the whole activity. Our teacher practice spaces aim to introduce new kinds of drills into teacher education, and if these drills prove successful, then they could be placed alongside discussions of theory, holistic simulation, and field placements in the repertoire of teacher educators. Our work is driven by two overarching design questions: (a) What are the affordances and constraints offered by different dimensions of authenticity in the design of teacher practice spaces, and (b) what new design opportunities open up when relaxing constraints of authenticity?

Background and Context

Grossman and colleagues (2009) define a three-part framework for learning in the helping professions (teaching, social work, etc.): *representation, decomposition,* and *approximation.* Teacher educators share representations of teaching (examples of lesson plans, videos of teaching) and then decompose and highlight important elements (pacing, classroom-management strategies, questioning techniques) from those representations. Teacher-learners then approximate these practices in a variety of ways, such as writing sample lesson plans or teaching mock lessons. The development of strategies for incorporating these approximations in teacher education are sometimes called *pedagogies of enactment* (Kazemi et al., 2009).

Within pedagogies of enactment, one dimension of authenticity that has been well theorized can be called *authenticity of complexity.* As Grossman et al. (2009) explain, one of the tensions with pedagogies of approximation is how much to approximate. Teaching requires deploying skills simultaneously in a complex assemblage—in a real classroom a teacher is simultaneously watching the clock, evaluating student attentiveness, drawing on knowledge about student relationships and competencies, and making decisions about pacing, behavior management, and student agency. Each of these teaching decisions is

intimately entangled with the others, so a tension emerges between isolating skills out of the complex assemblage for practice (since the isolated skill is easier to address than the whole assemblage) and recognizing that none of these elements is actually isolated in real classrooms. Some of Mursion's virtual teaching scenarios attempt to embrace this full complexity by having teachers teach lessons in front of a set of students with differing levels of understanding and classroom-management issues. Dotger's scenarios elide some of these issues by focusing on very realistic scenarios from teaching that are less complex than classroom teaching, such as talking to a single parent.

A parallel set of dimensions of authenticity can be called *authenticity of situation,* which we can break down into three subdimensions: *authenticity of setting, authenticity of role,* and *authenticity of task.* As noted above, most examples of pedagogies of enactment have taken authenticity of setting as a given: Most approximations in teacher education take place in realistic settings such as classroom teaching or meeting with parents. From the literature of game-based learning, there are good reasons to believe that games and simulations can support learning in fabricated settings that feel realistic. Games, like much of teacher education (Nolen, Horn, & Ward, 2015), are fundamentally grounded in theories of situated cognition (Brown, Collins, & Duguid, 1989). Gee (2004) posits that well-designed games can situate players perceptually, narratively, and socially in a way that leads to empathetic embodiment for complex systems. Within these deeply situated contexts, teachers can develop new skills, confront prior understandings, and work through problems in an embodied way (Gee, 2007).

Teacher educators, in part of out of logistical necessity, have regularly experimented with differing approaches to authenticity of role. To help one novice teacher role-play as a teacher, other novice teachers need to role-play as students, parents, or others. Beyond this logistical value, advocates of role-playing in teacher education have noted the value of role-playing as students, to understand people from diverse perspectives (Gay & Kirkland, 2003), empathize with the challenges of adolescence, or to remember the particular difficulties that novices face in understanding instruction from experts. Identity has also been a major consideration among game-based learning researchers. Games create opportunities for "projective identities," in which the identities and play decisions adopted in a game space are shaped by learners' beliefs outside the magic circle (Gee, 2007). As players reflect on their real and adopted identities, they have the opportunity to rethink their beliefs and empathize with others.

Authenticity of task can be defined as the degree to which a given task is an approximation of the real work of teaching, independent of whether or not it takes place in the real setting of teaching. In the violinist's bow game, authenticity of task is maintained by having the correct bow hold be the central objective of the game, even as authenticity of complexity is minimized (the violinist need not read music nor bow the strings) along with authenticity of setting (as bow games are designed for practice rather than performance). In teacher practice spaces, authenticity of task means that teachers are deploying realistic reasoning or technique, even as they engage in playfully unrealistic activities.

Our design hypothesis is that moving away from one or more of these dimensions of authenticity opens up a wider design plane for teacher practice spaces with more opportunities for including playfulness. In our design work, we view playfulness as a worthy aim in its own right. Playfulness leads to intrinsic motivation, enjoyment, and engagement (Hamari et al., 2016). From a game-based learning perspective, playfulness creates opportunities for exploration of new identities, beliefs, or techniques in a low-stakes setting. And as Grossman et al. (2009) pointed out, in the context of teacher education, the medium is the message. That is, we believe that if novice teachers can learn how to become effective teachers in a

playful and engaged way, they will continue to carry out the same approach to learning with their own students.

Over the past two years, we have used design-based research methods (Easterday, Rees Lewis, & Gerber, 2014) to develop a diverse set of practice spaces. In our design process, we typically begin with construct development, in which we identify a skill that we want novice teachers to develop and then consider what the skill looks like when expertly deployed in the classroom. Put another way, we often begin development by considering what an authentic task looks like when expertly deployed. We then prototype playful experiences that allow novice teachers to enact these skills or practices. The ideal design team includes a combination of teachers and teacher educators with a deep understanding of the targeted constructs along with game designers who bring encyclopedic knowledge of existing game mechanics. We iteratively improve new practice spaces through frequent playtests among our lab members along with regular lab-based playtests with preservice teachers, in-service teachers, and teacher educators. We refine our practice spaces and develop curriculum within which to embed them through field tests in teacher-preparation programs or in-service teacher professional development. In the projects discussed below, our field test partners include the MIT Scheller Teacher Education Program, West Virginia University, the College of St. Scholastica, Code.org, Exploring Computer Science, Mobile CSP, and the Hartford Magnet School in Connecticut, all of which have provided invaluable feedback on the projects.

In what follows we briefly describe early research on four of our practice spaces, and then we provide some examples of how different practice spaces address issues of authenticity, and how dimensions of authenticity interest with playfulness. Playable demos, game materials, curriculum suggestions, and other resources for all of the practice spaces described below can be found at tsl.mit.edu/practice.

Authenticity and Playfulness in Teacher Practice Spaces

Baldermath

Math-education research shows that novice teachers typically engage in three unhelpful practices when looking at student work: fixating on whether the answer is correct, making assumptions about the demographics or intelligence of the student, and making assumptions about the quality of instruction received (Pershan, Kim, Thompson, & Reich, 2017). By contrast, the most useful practices are looking closely at specific details of student work and making inferences and hypotheses about student thinking and understanding, the kind of thinking provoked by Notice and Wonder protocols.

Baldermath is a bluff-the-judge game about looking at student work (Pershan et al., 2017), co-designed by the author of the MathMistakes.org blog (Pershan, 2017), an online space where teachers discuss interesting errors from math students. To play the game, a judge leaves the room, and four players are given a homework problem taken from a fourth-grade classroom. One contestant is given an actual piece of student work for the problem, completed by a student with an incorrect or incomplete understanding of the problem. This contestant copies the work in her own hand and then invents a rationale for why the student thought she or he was correct. The other contestants invent incomplete or incorrect answers to the problem as well as their own rationales. The judge returns to the room, and the contestants role-play as students and explain their concocted rationales along with details of their (fabricated or real) student work. The judge then guesses which is the "real" student work. As with *Balderdash* or the *Wait, Wait*

Don't Tell Me News Quiz, correct guesses are fun for the judge and incorrect guesses are fun for the winning contestant.

In *Baldermath,* the game mechanic naturally encourages players to adopted productive practices of looking at student work while eschewing the unhelpful ones; the game is fun and winnable only by thinking carefully about student representation of thinking. In debriefing the game experience, facilitators can show teachers how the practices developed playfully during *Baldermath* can be productively applied to looking at student work in homework and classwork settings. Early evidence from near-transfer tasks suggests that game participants notice more details in student work and comment on them more after playing the game.

The design of *Baldermath* is anchored in an authentic task, looking at student work, where expert practice is well understood by math-education researchers. Aside from authenticity of task, the game avoids other dimensions of authenticity. The setting of fabricating student work is an artifice, no player acts in the role of a teacher, and the complexity of looking at student work in a classroom in real time is reduced by the game format. Abridging these dimensions of authenticity seems essential to allowing the playful elements of the game to emerge: Participants enjoy trying to think and write like students, and they enjoy employing mathematical reasoning in the service of bluffing and detecting.

TeacherMoments

TeacherMoments is a simulation designed for handheld devices, in which participants are immersed in short vignettes of teaching life rendered in text, animation, or video, and participants respond to scenario "triggers" with text or improvisational audio responses (Owho-Ovuakporie, Thompson, Robinson, & Reich, Manuscript submitted for publication). In live-actor clinical simulations used in teacher education (Dotger, 2013), actors are trained to portray parents or students in a specific situation. Briefing books given to actors include the background of the character and situation, as well as a series of "verbal triggers" that actors are supposed to include in the conversation (such as "You only called me out because you are racist" or "But what will do you when my [autistic] son hugs someone at an inappropriate time?"). Since these actors are meant to create standardized situations, TeacherMoments tests the viability of encoding these interactions entirely in text and video. For instance, Dotger (2013) has developed a series of parent simulations, including one in which a parent is upset because a class is too hard; in TeacherMoments, we record six video sequences of an actor playing this parent. Novice teachers participating in the simulation are required to provide improvised audio responses after each recorded conversational turn. In Dotger's live-actor role-plays, his four goals for participants are that (a) they experience the interaction as authentic, (b) the scenario generates a feeling of cognitive disequilibrium, (c) participants demonstrate an ability to remain calm under pressure, and (d) they can articulate some element of their teaching philosophy in response to the verbal triggers. Our playtests suggest that these four goals are met within the experience of TeacherMoments, even though our "actor" is prerecorded rather than live. Given that teachers may never meet a parent during their practicum experience, this application of TeacherMoments gives teacher-learners a chance to practice an important dimension of teaching before their induction period.

TeacherMoments is designed so that teacher educators can create different kinds of scenarios and case studies to rehearse different competencies. We have created a series of scenarios that help students address equity-teaching practices in computer science (CS) instruction (Robinson & Reich, 2018). Integrating culturally responsive pedagogies in computer science classrooms requires attention to

curriculum design and classroom practices and routines, but the "last mile" of equitable teaching is the in-the-moment decisions made by teachers. Equity-teaching practices that can shape in-the-moment teaching decisions include addressing preparatory privilege (the advantages of experience that many students, especially white and Asian boys, bring to CS classrooms), acknowledging students' intersectional identities, and adopting asset framings. Pedagogies of enactment, such as TeacherMoments simulations, are particularly effective for surfacing what Dotger and Ashby (2010) call "conditional inclusive ideologies." These are beliefs about equitable teaching that novice teachers espouse in discussions but often fail to act upon in specific circumstances. For instance, in one of our equity scenarios, two students are assigned a paired activity and one student asks to be allowed to move on to more advanced work rather than work with his disengaged partner. Even participants who articulate concerns about preparatory privilege in general may choose in the scenario to be more concerned with providing additional challenging work for the advanced students rather than addressing how his behavior may be marginalizing his partner. We find, following Dotger and Ashby, that pedagogies of enactment and participating in our interactive case studies are effective mechanisms for surfacing teachers' conditionally inclusive ideologies and opening up new conversations about the competing values that shape teacher decision making.

Most participants do not experience any of our implementations of TeacherMoments as particularly playful. In part, this is a function of the topics that we have chosen to explore—it may be that examining issues of marginalization and inequity should rarely or never be playful. However, it is also the case that TeacherMoments maintains authenticity of task, of role, of setting, and some degree of authenticity of complexity. Teacher-learners find the experience worthwhile, but not necessarily playful.

Eliciting Learner Knowledge (ELK)

Eliciting Learner Knowledge (ELK) is a two-person online game, with one person role-playing a teacher and another role-playing a student (Thompson, Roy, Wong, Reich, & Klopfer, 2018). In the *ELK* platform, players have a conversation through a text-based, chatlike interface. This format has two potential advantages over in-person role-plays: The transcript of the conversation allows for immediate reflection on specific, documented details in the exchange, and the conversation can occur when two people are not in the same location, as will be increasingly common as more teacher education happens online. Each round of the game focuses on a conceptual topic in science such as chemical reactions, evolution, or energy, or a topic in mathematics such as rational numbers, fractions, and proportions.

At the beginning of the game, each player receives instructions and a brief overview of the game; the person role-playing the teacher receives a learning objective and the person role-playing the student receives a learner profile with details of the conceptions and misconceptions held by the student being role-played. Players review the profiles, engage in a synchronous seven-minute conversation, and then both players take the same true/false quiz as if they were the "student." To encourage collaboration and communication between the players, the quiz is scored on (a) how well the student portrays the student profile, and (b) how well the teacher estimates the student's understanding. *ELK* has two goals: to help preservice and in-service teachers understand questioning strategies and to learn about possible student misconceptions.

ELK reduces authenticity of complexity by focusing on a single student–teacher interaction and by asking participants to set aside considerations of the student–teacher relationship and goals for advancing understanding to focus entirely on eliciting student thinking. It maintains authenticity of task,

authenticity of role, and authenticity of setting. *ELK* has more game elements than TeacherMoments, such as points, goals, and a timer, but it also rarely gets described by participants as playful.

Committee of N

Committee of N is a design-based card game for exploring education history and policy through school design (Haas, Reich, Feely, & Klopfer, 2016). Participants play as consultants charged with designing elements, such as classroom design or graduation requirements, of a new high school. Each *Committee of N* deck includes eight of these design elements, along with different sets of "value cards" representing belief commitments from the fictional new school. Participants work in pairs, and each round they are dealt hands that include one school-design element, and then three school values. Values can include purposes of education (e.g., assimilating immigrants or career/college readiness), theories of learning (e.g., behaviorism to constructionism), instructional methods (e.g., apprenticeship or flipped classroom). A pair might be asked to design the bell schedule for a school inspired by behaviorism, committed to vocational education, and enamored of project-based learning. Pairs create four to eight of these design elements, and then join up with several other pairs to create a school out of their elements. Teams then pitch these joint schools to a panel of "school committee" judges.

For many novice teachers heading out into the field for observations, the elements of a school seem fixed and immutable. *Committee of N* helps novice teachers see that every practice, every fixture, every routine within a school was designed at some point in history by people who held a set of values, and if we no longer hold those values we can design new school elements to match our new values. Not every change is equally easy—extracurricular activities can be redesigned easily whereas most communities can build a new school building only every few decades. Nonetheless, recognizing that school elements were once designed empowers novice teachers to imagine how they might be designed anew. Many students adopt the heuristic of describing the "value cards" underlying the practices and fixtures they see in their school observations. The game mechanic underneath *Committee of N* is essentially the same mechanic as a Tarot reading: Players create stories about the future guided by a series of arbitrary constraints, and by imagining different possible futures, players can reflect on which futures they would like to try to bring about in the world.

In some respects, *Committee of N* moves furthest from authenticity: The situation is far afield from teaching, participants play as consultants, the task is one that first-year teachers are unlikely to encounter as teachers, and even if the thinking work is complex, the work of consulting is orthogonal to the complexity of teaching. Participants do typically find the experience playful. They enjoy the creative enterprise of imagining new schools, and they especially enjoy developing school elements based on absurd combinations of elements. What feels authentic within the task is the practice or disposition of assuming that school elements embody values, and that decoding those values can reveal how school elements fit together, neatly or uncomfortably.

Design Conjectures: Authenticity and Playfulness in Teacher Practice Spaces

Drawing generalizations from small data sets is always a risky endeavor, but nevertheless in the section we set forth three design conjectures that we adduce from our set of four cases.

First, authenticity of task is the preeminent consideration in the development of teacher practice spaces. *Baldermath* and TeacherMoments are both rich experiences for novice teachers because the

intellectual work in the practice space develops skills and dispositions that support good teaching. Anchoring on authenticity of task may allow for more flexibility in changing other dimensions of authenticity. Even in *Committee of N,* which seems far afield from the work of teaching, players engage in thinking patterns—imagining different kinds of schools or connecting school elements to their underlying values—that prove valuable in both understanding school environments and navigating change within them.

Authenticity of task is essential, but other forms of authenticity may be obstacles to playfulness. In our set of four practice spaces, TeacherMoments is the least gamelike and the most simulationlike, and most teachers do not find the experience playful, even if they do find it meaningful and worthwhile. While the interaction in *ELK* is quite authentic, players experience the chat interface as artificial. This allows some element of playfulness, yet it still does not feel like a game to most teachers. By contrast, a practicing teacher will never need to fabricate incorrect student work as in *Baldermath.* Yet because of this, teachers' experiences with *Baldermath* are more playful. We find in our feedback across playtests of these different environments that typically the closer an activity replicates authentic teaching practice, the less likely it is to feel playful and fun. It may still feel authentic, challenging, and worthwhile, but novice teachers typically do not experience practice spaces that maintain authenticity of setting as playful.

Finally, within practice spaces, we see varying approaches to embedding "good practice" or "expert practice" within the design of gameplay. The game-development process for *Baldermath* began from a clearly defined construct for looking at student work—with well-defined productive and unproductive practices, and the mechanics of the game naturally guide participants away from unproductive practices and toward productive ones. A simple debrief at the end of the experience may be sufficient for novice teachers to consciously adopt these new practices. *Committee of N* does not scaffold a specific teaching skill per se, but participants learn a useful heuristic—the idea of values underlying a school design element—that can help them better understand the constraints of their context. Our hypothesis is that teachers will improve their assessment practices because they empathize more closely with how students experience rubrics and recognize more deeply the tensions in designing effective rubrics. So within the notion of authenticity of task, we see divergence into experiences that deliberately guide players toward expertise versus those that encourage players to "admire the problem." We see promise in exploring both pathways.

In future work, we plan to continue to explore these dimensions of authenticity and playfulness and explore new ways for preparing teachers with specific skills, dispositions, and knowledge that they can integrate into the complex work of classroom teaching. While player feedback from these games suggests that novice teachers find them enjoyable, provocative, and useful, another important dimension of research will be to evaluate whether and how they work in actually improving teaching practice. In future research, we plan to observe novice teachers before, during, and after playing with practice spaces to see whether participation in practice spaces leads to meaningful changes in teacher practice.

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