Playful Discourse Practices in Guided Play Learning Environments

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Abstract: This paper examines how teacher guided play can support inquiry while learning science. Guided play has been positioned as a balanced approach to supporting learning in ways that value the curious, playful, and child-directed characteristics of play. We present interaction analysis of two cases of teacher guided play, where we examine how teachers guide students in ways that not only lead to instructional goals but support the playful exploration that is important in students' learning experiences. Findings in this paper reveal how guided play changes participation and discourse practices as teachers incorporate these open forms of learning into classroom spaces.

Introduction

In recent years, there has been a growing interest in the importance and potential of young students learning through play (Hirsh-Pasek, et al., 2009; Papademetri & Louca, 2020; Youngquist & Pataray-Ching, 2004). This work has provided evidence that play can support the development of young learners' creativity, engagement, socio-emotional competence, and cognitive development (Ashiabi, 2007; Nicolopoulou, Barbosa de Sá, Ilgaz, & Brockmeyer, 2009; Pyle, DeLuca, & Danniels, 2017; Saracho, 2012). Within learning contexts, particularly in schools and classroom settings, there has been a focus on *guided play*, where teachers and educators can engage in play to guide young students in learning. Our study blends adult guidance, the investigation of complex scientific phenomena, and opportunities for young students to playfully explore these science concepts.

While recent literature on guided play shows how it can scaffold and lead to learning (Fisher et al., 2011), we further unpack how play—specifically how *paidia play* can be guided in ways to support students in investigating conceptual ideas. We do this by examining how guided play transforms what participation and discourse can look like as students engage in more playful and spontaneous forms of learning and sensemaking. This paper will examine how guided play can function as an agentic space where students have access and opportunities to participate, explore, and learn science in different ways. We ask: *How does guided play support students' participation and discourse while learning science?*

Theoretical framework

Play

Although there is little consensus on how to define play, one broad distinction relevant to our analysis is Caillois' (1961) concept of paidia play. Paidia play is characterized by its spontaneity, with any rules for the play arising from within the play activity itself. Examples include playing in a jungle gym, rolling down a hill, or wrestling with a friend. Unlike games (often called *ludus* play) there are no pre-established winners or losers, nor any one right way to play. One way to think about paidia play is as an orientation towards one's activity, rather than any defining characteristic of the activity itself. As Bateson (1955, pp. 41) put it, play is a "meta-communicative stance" towards one's own activity where the meaning of actions is flexible and negotiable. For example, in a play fight, a punch is meant to stand in for a real punch, but it does not mean the same thing as it would in a real conflict. Colloquially, we might say that paidia is a term that emphasizes the 'playfulness' dimension of play. For our analysis, we examine interactions where students are taking a playful, paidia stance towards their science inquiry, and how teachers guide students within this playful frame to support learning.

Socio-dramatic play

While some contend that socio-dramatic play and paidia play are synonymous (Frasca, 2003), it is important for our analysis to distinguish how socio-dramatic play is often structured and governed by implicit socio-cultural rules. For example, children who play house might take on the role of "parents" by pretending to drive to the store, hold a baby, or make dinner. We think of socio-dramatic play as a subset of paidia play in the sense that it can also unfold spontaneously in playful ways, but the addition of explicit socio-cultural roles and rules shifts how it influences and organizes children's activities and learning.

For young children, play serves as one of many cultural tools that provides access to participation in cultural practices mediated by social norms, rules, and histories. During socio-dramatic play, a young child can negotiate the cultural rules and roles that may not be accessible to them in their everyday lives. For example, Vygotsky (1980) described two sisters who play "sisters" together. Typically, being sisters is in the background of their every experience—rarely do they make visible the meaning of their relationship. However, playing "sisters" foregrounds the rules of sisterhood (e.g., dressing and talking alike or sharing parents). Thus, playing as "sisters" transforms sisterhood from an implicit relationship to an explicit social role with corresponding rules and norms. These rules that ground sisterhood provide these young children with an opportunity to socialize in culturally relevant ways. That is, making the rules explicit in play reflects how they perceive sisters should behave in the real world. The importance of socio-dramatic play is therefore not only for fun and whimsy, but the opportunity to reflect, re-enact, and explore experiences rich with shared sociocultural rules, roles, and norms.

Socio-dramatic play also gives children the opportunity to explore imaginary situations that are not a part of their everyday lives. In order to help them gain access to an imaginary situation that they otherwise would not be able to explore, children use familiar objects and ideas in new ways. For example, in socio-dramatic play a signifier (e.g., a stick) can be used to represent the meaning of the signified (e.g., a horse) (Vygotsky, 1967). Vygotsky described this process as a pivot, where children could attach abstract meaning to known objects in order to satisfy the imaginary situation in play. Thus, when a child plays "horsie," they can imagine and use the stick to represent the horse. This expands the possibilities of their immediate environment and provides opportunities to use everyday experiences to help investigate the rules of a situation that they are not yet able to fully understand. In this way, play acts as a leading activity of childhood, driving the development of new and more complex cognitive processes in young children as they enact playful versions of situations that are just beyond their reach (Duncan & Tarulli, 2003).

Teacher guided play

Guided play differs in that the goals of the play activity include adult-driven learning goals. It "melds exploration and child autonomy with the best elements of teacher-guided instruction" (Weisberg et al., 2016, pp. 1). Research on guided play activities have shown to be effective and promising for education, including positive learning outcomes in literacy, math, and science learning (Bellin & Singer, 2006; Enyedy, et al., 2017; Sarama & Clements, 2002). When learning through guided play, students can gain agency, control, and choice in their learning experiences (Jensen, Pyle, Alaca, & Fesseha, 2019; McInnes, Howard, Crowley, & Miles, 2013). This is what makes guided play a powerful learning and sensemaking experience that connects with students' lived experiences and provides them with opportunities where we can playfully challenge and build on their ideas and thinking.

During guided play, the role of the teachers and how teachers provide guidance can differ and vary based on classroom and student needs. For example, a common method of guiding play is when teachers provide materials and set up the classroom environment for children to play in (Neuman & Roskos, 1992). Relevant to our analysis, teachers can also provide guidance by participating *with* students in the play activity; "teachers enhance children's exploration and learning by commenting on children's discoveries; by co-playing along with the children; through asking open-ended questions about what children are finding; or exploring the materials in ways that children might not have thought to do" (Fisher, et al., 2011, pp. 343). This version of guided play, where teachers actively co-participate alongside students in the activity, is an untraditional way of participating in classroom discourse and disciplinary work.

In this paper, we question how participation and discourse in inquiry learning can shift and transform as a result of both teachers and students co-participating in a playful learning environment. Our paper presents analysis of two cases of paidia play, where teachers guided learning within these playful environments in different ways. In the first case, we present an example of paidia play where the teacher suggests an emergent and playful goal that fluidly becomes part of inquiry. In the second case, we present an example of socio-dramatic play, a version of paidia play where students spontaneously organize their actions according to the implicit socio-cultural rules of a role. In both cases, we analyze how teachers balanced students' agency while working towards broader curriculum goals and examine how guided play shifts disciplinary discourse, participation, and learning.

Science through technology enhanced play

To set up the classroom environment in ways that promote playful activity within scientific inquiry, we leverage technology developed for the Science through Technology Enhanced Play project (Danish, et al., 2015; 2020). The project is a mixed reality learning environment that uses motion tracking cameras (labeled K1, K2, & K3 in Figure 1) to allow students to playfully embody and explore science concepts. For this study, students engaged in guided play as water particles. The environment tracks and transforms students' movements into a digital simulation of water particles moving on a screen (Figure 1). We first fostered playfulness by asking our students to imagine themselves shrinking down to the size of microscopic water particles. Guided by their classroom teacher, students took on these microscopic roles to discover the rules that governed changes in states of matter as they moved in coordination with their peers. The mixed reality technology also guided students' play by providing real time feedback to students about how their different movements can create and change the states of matter represented on the shared screen.

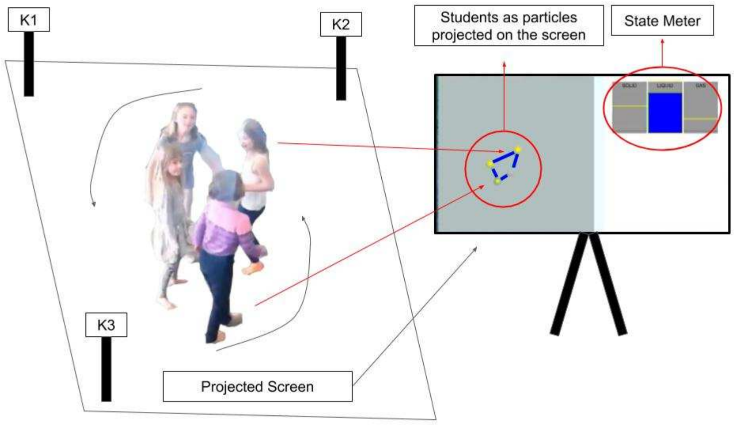

Figure 1. Students in the mixed reality environment

The facilitators used the mixed reality environment and playful prompting (e.g., having students crawl through a hula hoop dubbed the "Particle Shrink o Rator") to set up an imaginary situation in which students can investigate the rules of particle behavior, such as how speed, distance, and energy impact the way that matter changes into different states. Across the unit, students explored both macroscopic (e.g., observable properties such as solids keep their shape) and microscopic features of states of matter (e.g., particles in a gas move quickly). Students spent the majority of the unit exploring how water particles change at the microscopic level and describing the rules for each state in terms of the speed and the distance between particles. Students were given agency to explore the simulation and notice different aspects of state change as they interacted in fairly freeform ways. As the unit progressed, the teachers added increasing amounts of structure to students' play in order to move them towards more formal modeling practices.

In both their play and modeling, students were encouraged to move in ways that reflected how water particles behave in solid, liquid, and gaseous states. Through their explorations, they uncovered the underlying rules that created each state of matter in the simulation by using the visualizations of the technology, namely the color of the bond or a state meter. To create a solid, students moved slowly (often vibrating in place) while spreading out to have some distance in between peers. This created white colored particles on the screen. To create a liquid, students slowly weaved around the play space while keeping a closer distance to create blue particles (see Figure 1). Finally, to create a gaseous state of matter, students ran around the play space at a fast speed with plenty of distance between peers to create red particles in the simulation.

Methods

Students in this study were from five mixed-aged classrooms of 1st and 2nd graders (ages 6-8) from two different sites in the United States. Three of the classrooms were from a large city on the west coast (site 1), while two classrooms were from a smaller midwestern city (site 2). The focus of our analysis was how teacher guided play provided students with new and unique opportunities to participate in science learning.

Using interaction analysis (Jordan & Henderson, 1995), we analyze and present the data in detail to explore the mechanisms through which teachers noticed and supported playful interactions to guide students towards scientific inquiry. We first reviewed and content logged the larger video data corpus across all five classrooms, which consisted of 24 classroom videos of approximately 45-60 minutes in length. Based on our initial video viewing, two classrooms were selected for more detailed analysis, one from Site 1 and one from Site 2, because the teachers in these classrooms engaged in the most amount of paidia play. We then marked moments in these classrooms to create a collection of teacher-guided paidia play— including both spontaneous playful moments (e.g., moving like a caterpillar) as well as more structured versions of paidia play (socio-dramatic play). Within these moments, we focused on episodes where teachers guided and used these playful moments to build towards scientific learning goals. These episodes were transcribed using the Jeffersonian transcription system (Jefferson, 2004) and analyzed through multiple rounds of video viewing with the research teams at both sites to examine the ways in which the different teachers guided students' play. We present our analysis to illustrate the potential of guided play that we found to be reflective of the larger corpus of data. Each case examines ideas that were proposed during paidia play that resulted in teachers guiding students towards greater understanding of the scientific phenomena.

Findings

Case 1.

In our first case we present analysis of discourse from an example of teacher guided paidia play at site 1, where the teacher (Ms. Jones) guides her students in inquiry by spontaneously pitching a playful idea to encourage her students to explore science concepts. The analysis details how students used the colors that were represented in the visualization (Figure 1) to make observations, conjectures, and conclusions on how speed and distance between particles result in each state of matter. Students often associated their body movements with colors before connecting the movements to more abstract representations of their activity, before finally connecting these abstractions to the states of matter. For example, students would first discover that moving fast around the room caused themselves to turn red on the screen, before concluding that spreading out and moving in faster speeds represented gas particles.

In the following transcript, students had yet to make observations on how to create blue (liquid). However, instead of suggesting a direct curricular goal such as, "let's make blue," Ms. Jones suggests trying something they had done before, to hold hands and walk in a circle. The decision to guide students towards playing in a circle was interesting because the shape she suggests does not have any scientific relevance—it doesn't represent any of the structures of solid, liquid, or gas particles. However, for the students it is a spontaneous, yet clear and understandable rule that Ms. Jones uses to guide inquiry.

1	Ms. Jones	One of the *things* that we did *before* to try and make the different colors (0.2)
2		was we all got in a circle and we moved in different ways. Could we try that?
3	Students	Yea::
4	Student 1	LET'S TRY TO MAKE A GINORMOUS CIRCLE AND SEE IF IF (0.1) if...one side is
5		blue and one side is red
6	Ms. Jones	Oh so you're looking at *where* we are in the space?
7	Student 2	EVERYBODY GET IN A CIRCLE!
8		((Students all gather in a circle))
9	Student 3	HOOK UP! HOLD EACH OTHER'S HANDS!

Figure 2. Students and Ms. Jones play in a circle

What made this example significant was not only that Ms. Jones didn't specify a science goal (line 1), but *how* the students took up her idea (line 4). In lines 3-5, we see how students are engaged in paidia play as they excitedly and fluidly build on her idea. We see evidence of this as students responded to Ms. Jones' by suggesting to make the circle more extreme and "ginormous", and by elaborating on her bid to focus on observing what happens next (Figure 2). This allowed Ms. Jones in line 6 to offer more guidance by re-phrasing and abstracting the students' idea of looking at spatial relations. Although we are focusing on the teacher's guidance, it is important to note that in lines 7-9, it is the students who take the agency to organize each other to carry out the play. After playing in the circle, a few students broke away and began to make further observations.

10	Student 1	And when we were spread out it was white and I think white was the *longest* and then
11		blue is the *shortest* because we were together and then the yellow is the shortest
12	Ms. Jones	So it goes white is long, blue is medium, and yellow is the shortest?
13	Student 4	What's red?
14	Ms. Jones	*Oooo* Student 4 wants to know how you make red

After walking in a circle, Student 1 (lines 10-11) observed and hypothesized the importance of distance when creating each color. While Student 1 was not completely accurate, it was the first time the students had made the conceptual connection between the distance between particles and different colors/states. Further, Ms. Jones was able to use her ideas to guide the class towards a crisp description of the role distance plays in making different colors and states of matter (line 12). The exchange ends, with the students specifying a goal for their next exploration--making red (line 13). This short exchange shows how the teacher's guiding moves of bringing spontaneous goals through paidia play can still benefit students with greater knowledge of the science content. Ms. Jones was able to guide student thinking to be more abstract and precise while still allowing the students the agency to set their own goals. The significance of this example is how Ms. Jones guided her students by bringing paidia play to life. She spontaneously pitched a seemingly unscientific goal to inspire her students to explore being particles together. Her guiding moves in paidia play led to students exploring the movements of a circle, and explore with whether these familiar sets of movements can help them create and embody states of matter. Here, teacher guided paidia play offers students opportunities to bring in these familiar everyday ideas to use as metaphors or starting points for investigating these concepts during scientific inquiry.

Case 2.

In our second case, we examine an example of student-initiated socio-dramatic play and how teacher guidance shaped the interactions for inquiry. While we consider socio-dramatic play to be a subset of paidia play, we make this distinction because of how students in this example move and interact according to the rules governed by a social role (or in this case, a student's exaggerated parody of a social role). Here, the students take on the role of an "old man" in order to establish both the goals and rules of their play and inquiry activity. Our analysis focuses on the discourse that unfolded while the teacher (Ms. Wilson) guides students' socio-dramatic play of being an old man towards the larger science learning goals. In the following transcript, the students were initially engaged in unstructured paidia play, with students running in circles and moving in exploratory ways to see how the simulation might change in response. Student 1 then proposes a goal for their play, and with the teacher's support, the activity begins to shift into more structured socio-dramatic play (line 1).

1	Student 1	Guys let's all be water! Guys-
2	Ms. Wilson	Oh (.) I kind of like Student 1's suggestion can you all try to be um (.)
3	Student 2	Liquid
4	Ms. Wilson	Yes (.) try to be liquid
5	Student 1	Student 3! Get clo- start moving like an old man
6	Ms. Wilson	So [look at the screen]
7	Student 4	[Old granny walking] [through!]
8	Student 1	[OH!] (.) we were just all
9	Student 4	Old granny moving through!
10	Student 1	OH! It's [doing it]
11	Student 3	[We're all-]
12	Student 4	Will you help me [please young lady]
13	Ms. Wilson	[Oh my gosh! (.) ((gasp))] (1) I have seen success
14	Student 4	[Young] lady (.) would you [please help me]
15	Ms. Wilson	[How] (.) [what am I] seeing to show that you are all
16		water what am I seeing [on the screen]

17	Student 4		[I need a cane]
18	Student 3	[Blue]	
19	Student 1	[It's] blue	

Figure 3. Students moving like "old people"

The role of being an old man is a clever way to communicate, embody, and self-regulate students' movements to move slowly, get close, and become liquid (Figure 3). The movement of an "old man" is parallel to moving like liquid particles in the mixed reality environment; in that liquid particles move slowly and closer together. As the students use the idea of the old man to slow their movement and arrange themselves together, the teacher guides the effects of the socio-dramatic play and tries to guide students' attention to the screen (line 6 & lines 15-16). In line 6 she says, "look at the screen" to guide students' attention towards the effects of their "old man" movements on the digital representation of particles. Since the screen (Figure 1) provides information on how students' movements create each state of matter, Ms. Wilson's guiding move to draw attention to the screen verifies that moving within the rules of an old man results in embodying liquid particles. In line 13, she states she has "seen success", and in line 15 she asks them to see what she sees on the screen. As a result, the students consistently look back to the screen to check for the creation of liquid while playing as old people. With his hand still clutching his back, Student 1 notices that they've successfully formed liquid particles with a shout of "Oh! It's doing it!" (line 10), and later notes that the particles have turned blue (line 19).

Within this guided socio-dramatic play space, the rules of embodying and pretending to be an old man were set by students as part of the imaginary situation. These rules and role of the old man were then guided by Ms. Wilson so that the socio-dramatic play would connect back to inquiry; making the scientific rules of being liquid visible. By calling attention to the technology, Ms. Wilson's guiding discourse helped organize the class to collectively work together in creating and verifying how to embody liquid particles.

Conclusions

The imagination of shrinking and pretending to be microscopic particles opened opportunities for students to enact, explore, and question the rules of matter in a variety of playful ways. We detailed in both of our examples how teachers and students engaged in play; where students maintained both a playful agency to their learning while still engaged in inquiry. In the first example, we see how Ms. Jones guided students' exploration of abstract scientific phenomena by spontaneously engaging her students in play. Here, the fluidity and emergent rules and goals of paidia play became tools for inquiry that Ms. Jones used to explore the significance of space and distance relevant to states of matter. In the second example, Ms. Wilson guided students' socio-dramatic play, where students collectively played the role of an old man in order to embody liquid particles. The significance of this example is that Ms. Wilson guided students' socio-dramatic play by connecting the embodied outcome of the imaginary roles and rules of the old man back to tools for inquiry. Across both examples, we saw how teachers led or responded to these varying kinds of play, guiding students towards the goals of inquiry while simultaneously valuing and building on students' agency and playful ideas. The teachers blend the exploratory benefits of children's play with the structure and content richness of formal classroom learning, creating a playful scientific inquiry space to encourage sensemaking.

Playful discourse for learning science

In both examples of teacher guided play, we primarily attend to the discourse, or talk that occurs as teachers guide and navigate students' interactions. These moments of teacher guided play reveal the unique opportunities for students to engage in alternative discourse and participation practices to help them learn and understand science. As a result, the discourse of participating and engaging in science is inherently different from traditional forms of learning, opening up what counts as learning and redefining how disciplinary discourse can look like in guided play. A commonality across the two types of guided play is how ideas and interactions that would typically be categorized as “unscientific” or “irrelevant” became powerful resources. Through guided play, students can draw from the known world around them to build an understanding of unobservable abstract scientific concepts in ways that blend ideas and behaviors from informal play with the concepts and questions of formal science.

Additionally, teachers in guided play took up students’ ideas and made them objects of inquiry for the whole class. In the second case, the concept of the old man was accepted by the teacher as a valid form of participating in classroom science learning. Here, the teacher’s response to students’ playful performance of being an old man was to guide and connect their movements back to the movements of liquid particles in the simulation. Similarly, in the first case, we saw how students built on the teacher’s suggestion to get into a circle by questioning spatial placement as a potential method of creating different states of matter. These ideas were a valued part of participating and engaging in scientific practices. In this way, guided play offers a way for students and teachers to navigate the sometimes uncomfortable territory of blending dominant school scripts with children’s play. Integrating students’ play into science learning allows students and teachers to have a more dialogic conversation about science, in which these unconventional, playful ideas are taken up as a valuable resource for doing science.

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