

SCIENCE, YOUNG CHILDREN, AND PLAY: A REFLECTIVE ANALYSIS

YI-HUANG SHIH

Center of Teacher Education,
Minghsin University of Science and Technology, Hsinchu, Taiwan

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ABSTRACT

Preschool teachers should recognize play as a central pathway through which young children understand and interpret the world challenges conventional curriculum design. Instead of asking how to “use play to teach science,” educators are encouraged to ask how children’s ways of being, knowing, and relating can be honored within scientific inquiry. Such an approach foregrounds children’s agency, respects their subjectivity, and positions early childhood science education as a space of democratic, relational learning.

Keywords: Science Education, Problem-Solving Skills, Young Children

1.0 INTRODUCTION

Building on the view that play is not merely a pedagogical strategy but a fundamental mode of being for young children, this discussion argues that early childhood science education should move beyond a transmission-oriented model toward a relational and experiential orientation. When science is framed primarily through disciplinary logic—predetermined concepts, procedures, and outcomes—children’s everyday experiences are often marginalized (Dewey, 1938; Fler, 2010). In such cases, play risks being reduced to an instrumental tool for delivering content rather than recognized as a meaningful process through which children actively construct and interpret the world. From a sociocultural perspective, young children are not passive recipients of knowledge but competent meaning-makers who engage with scientific phenomena through curiosity, imagination, and embodied exploration (Rogoff, 2003; Vygotsky, 1978). Research has shown that children’s play provides a critical context for inquiry, hypothesis testing, and sense-making, as children negotiate meanings with peers and materials (Fler, 2011; Siraj-Blatchford & Sylva, 2004). In early childhood settings, scientific understanding emerges not from simplified adult concepts but from children’s lived experiences with natural and material worlds. This reorientation has important implications for the teacher’s role. Rather than imposing scientific structures prematurely, teachers are called to adopt a dialogical and responsive stance—listening to children’s questions, interpreting their meanings, and co-constructing knowledge with them (Edwards, 2017; Freire, 2000). Empirical studies suggest that when teachers engage in sustained shared thinking with children, learning is deepened and becomes more conceptually rich (Siraj-Blatchford et al., 2002). Ultimately, recognizing play as a central pathway through which young children understand and interpret the world challenges conventional curriculum design. Instead of asking how to “use play to teach science,” educators are encouraged to ask how children’s ways of being, knowing, and relating can be honored within scientific inquiry. Such an approach foregrounds children’s agency, respects their subjectivity, and positions early childhood science education as a space

of democratic, relational learning (Biesta, 2015; Fler, 2019; Shih, 2025a, 2025b, 2025c, 2025d).

2.0 HOW TEACHERS UNDERSTAND YOUNG CHILDREN in INQUIRY-BASED LEARNING CONTEXT

Through articulating their internal images of teachers and children, educators engage in a process of reflective practice. Furthermore, professional knowledge is not derived solely from technical rationality but is continuously generated through cycles of reflection-in-action and reflection-on-action. When teachers externalize their understandings of the “child as learner” through writing, dialogue, or visual representation, they are able to surface long-internalized yet largely unquestioned educational beliefs and implicit assumptions, including views related to authority, control, ability, and subjectivity (Kelchtermans, 2009; Loughran, 2002). From a sociocultural constructivist perspective, images of the child are not fixed entities but are continuously constructed and reconstructed within specific historical and cultural contexts (Vygotsky, 1978; Rogoff, 2003). When teachers conceptualize children as active meaning-makers rather than passive recipients, pedagogical relationships shift toward more dialogical and collaborative forms. This shift aligns with Freire’s (2000) notion of dialogical pedagogy, which emphasizes the co-construction of knowledge within egalitarian teacher–learner relationships rather than unidirectional transmission. Empirical research indicates that reflective activities such as drawing, narrative inquiry, and teaching journals can promote coherence between teachers’ beliefs and classroom practices (Beauchamp & Thomas, 2009; Kelchtermans, 2009; Lin & Shih, 2025; Ye & Shih, 2021; Lin & Shih, 2026). In early childhood science education contexts, such reflective processes support teachers in reconceptualizing children’s cognitive, emotional, and social capacities, thereby enabling the development of curricula and pedagogical strategies that are more responsive to diversity and grounded in respect for children’s agency (Hedegaard & Chaiklin, 2005; Fler, 2010).

3.0 SCIENCE IS FUNDAMENTALLY a PROCESS of CURIOSITY

In early childhood education, science should not be understood as the transmission of formulas or fixed conclusions. Instead, it is fundamentally a process of curiosity, questioning, experimentation, and revising ideas through trial and error. Moreover, these approaches to learning address important goals of education that include content knowledge, epistemic practices, and soft skills such as collaboration and self-directed learning. This view is closely aligned with the principles of inquiry-based learning (IBL), which emphasize learners’ active engagement in posing questions, investigating phenomena, and constructing meaning through experience rather than receiving knowledge as ready-made answers (Hmelo-Silver, Duncan, & Chinn, 2007). From this perspective, a critical issue for teachers’ reflective practice is whether science is introduced too early as a body of “standard answers,” thereby restricting children’s opportunities to experience uncertainty, surprise, and wonder. Preserving these qualities is essential for fostering authentic scientific inquiry and sustaining young children’s intrinsic motivation to learn.

4.0 PLAY IS a CENTRAL PATHWAY WHICH YOUUNG CHILDREN UNDERSTAND THE WORLD

The international trend to increase the cognitive achievement of early childhood children has generated a need for better understanding how concept formation occurs within play-based programs. Play-Based learning is a cornerstone of early childhood education provision. From Piaget to Vygotsky and contemporary theories of play, play is not merely a medium for promoting learning but a central pathway through which young children understand and interpret the world. When teachers conceptualize play only as an instrumental means to achieve predetermined instructional goals, they risk constraining children's opportunities for meaning-making as active subjects within play (Edwards, 2017; Fler, 2011; Nicolopoulou, 2010; Piaget, 1951; Vygotsky, 1978; Wood, 2013). The issue, therefore, is not whether play is present in the classroom, but whether children's interpretive authority and creativity in play are genuinely recognized (Pramling Samuelsson & Fler, 2009). Decades of research into early childhood teacher confidence and competence in science abound. Mostly what is reported is that teachers do not have the background discipline knowledge of science concepts and thereby lack confidence to teach in this area. The net effect is a worryingly limited amount of science being taught in the early childhood period. This paper proposes a different approach to conceptualising teacher confidence and competence in science through a theoretically informed study that gives new directions into how to solve the pressing problem of increasing the amount of science taught in play-based settings. Extending this perspective to early childhood science education reveals that scientific learning is likewise a process of interacting with the world and constructing meaning. For young children, "science" is not about formulas and final answers, but about curiosity, questioning, trying things out, failing, and revising through playful exploration. When teachers prematurely reduce science to standardized answers and procedural steps, they may diminish children's agency and interpretive space in the inquiry process. By contrast, when science activities are understood as inquiry practices that sustain the spirit of play—inviting children to engage with phenomena through hands-on action, imagination, and dialogue—science learning becomes not the transmission of knowledge, but the generation of meaning (Fler & Ridgway, 2014; Gopnik, 2012).

5.0 CONCLUSION

Scientific literacy is the primary goal of science education (Bartels & Lederman, 2022). Therefore, this study seeks to foster scientific literacy in early childhood learners. This article concludes by examining how teachers should understand young children in early childhood science education activities. It argues that play should not be regarded merely as a tool for achieving learning objectives, but rather as a fundamental way for children to understand the world and exist within it. In other words, play is the core pathway through which young children interact with the world, interpret their experiences, and construct meaning in young children.

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