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The Nature and Examples of Science Games for Young Children

Yi-Huang Shih
Center of Teacher Education, Minghsin University of Science and Technology, Hsinchu, Taiwan

Abstract: Science education is increasingly recognized as a vital component of early childhood curricula. Beyond the transmission of content knowledge, early science instruction plays a critical role in fostering essential process skills such as observation, experimentation, problem-solving, and critical thinking. As Cabe Trundle (2015) highlights, introducing science in developmentally appropriate ways enables young children to engage with their environment through sensory exploration and inquiry. These early encounters not only lay the foundation for lifelong scientific learning but also nurture a sense of wonder and appreciation for the natural world. This study investigates the nature and practical applications of science games designed for young children, examining their potential to spark interest in science, build foundational scientific literacy, and cultivate inquiry-based thinking skills. Through this inquiry, the study aims to propose concrete and feasible directions for curriculum design and pedagogical practice, thereby enhancing the overall quality and effectiveness of early childhood science education.

Keywords: early childhood science education, play, young children

1. The Importance and Challenges of Science Education in Early Childhood

Science education is increasingly recognized as a crucial component of early childhood curricula. Beyond merely delivering content knowledge, early science instruction fosters essential process skills, such as observation, experimentation, problem-solving, and critical thinking. As Cabe Trundle (2015) emphasizes, introducing science in developmentally appropriate ways encourages young children to explore their environments through sensory engagement and inquiry. These early experiences serve as the foundation for lifelong scientific learning and cultivate a sense of wonder and appreciation for the natural world. Importantly, early childhood education (ECE) settings offer unique environments where science learning can thrive. These settings are not only sites for cognitive development but also spaces where children build social identities and learn the foundational values of empathy, cooperation, and inclusion (Arndt, 2018). The communal and relational nature of early learning environments allows for science to be explored collaboratively, enabling children to share ideas, ask questions, and learn from one another. Group investigations, nature walks, and simple experiments can reinforce a sense of belonging while promoting scientific reasoning within a supportive social context. However, despite its importance, high-quality science education remains underrepresented in many early childhood classrooms. Several factors contribute to this gap. A significant barrier is the low self-efficacy of many early childhood educators regarding science instruction. Research suggests that educators often feel unprepared to teach science, either due to limited subject knowledge or a lack of confidence in facilitating inquiry-based learning (Gerde, Schachter, & Wasik, 2013). In addition, many programs lack the necessary resources—such as materials, curriculum guides, and professional development opportunities—to support rich and sustained science learning experiences. This underinvestment in early science education is concerning, especially given the multiple benefits of integrating science into early learning. High-quality science experiences have been shown to support not only conceptual understanding of scientific phenomena but also critical readiness skills in other domains, including language, literacy, and mathematics. For example, discussing observations enhances vocabulary development, while measuring and comparing results of experiments strengthens early numeracy skills. As Gerde, Schachter, and Wasik (2013) note, science learning can serve as an interdisciplinary anchor that brings together multiple domains of development. However, the integration of multiple developmental domains highlights the importance of play-based activities in early childhood science education (Shih, 2025a, 2025b, 2025c). This study seeks to investigate the nature and practical applications of science games for young children, analyzing their potential to spark children's interest in science, foster foundational scientific literacy, and develop inquiry-based thinking skills. Through this exploration, the study aims to offer concrete and feasible directions for curriculum design and pedagogical practice, thereby improving the overall quality and effectiveness of early childhood science education.

2. The Nature and Examples of Science Games for Young Children

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Preschool science games are designed to cultivate young children's understanding of fundamental scientific concepts, attitudes, and problem-solving skills through play-based learning. These games integrate

enjoyment with education, emphasizing key processes such as observation, manipulation, questioning, and exploration. The focus is placed on the learning process rather than solely on outcomes, encouraging children to engage in hands-on activities and contextualized experiences. Through such experiences, children gradually make sense of abstract scientific phenomena while developing a spirit of inquiry and logical thinking. As Lorina (2025) and Shih (2025a, 2025b, 2025c) suggest, engaging with science during early childhood is a powerful way to nurture curiosity and foster a lifelong love of learning.

2.2 Principles for Designing Science Games for Young Children

Designing science games for young children requires a thoughtful integration of educational objectives with playful and engaging experiences. To ensure developmental appropriateness and to foster curiosity, inquiry, and foundational scientific thinking, the following principles can serve as a guide: (1) Play-based and child-centered – Games should prioritize children's interests and natural play patterns to encourage active participation; (2) Inquiry-oriented – Activities should stimulate questioning, exploration, and discovery; (3) Hands-on and multi-sensory – Games should involve tactile, visual, and auditory experiences to deepen understanding; (4) Integrated with everyday life – Scientific concepts should be connected to children's daily experiences to enhance relevance; (5) Supportive of positive attitudes toward science – Games should foster enjoyment, confidence, and curiosity about the scientific world (Duan, 2025a; Shih, 2021).

3. Examples of Science Games for Young Children

3.1 Cloud in a Bottle: A Hands-on Activity for Introducing Atmospheric Science to Young Learners

This educational experiment invites young children to construct a cloud inside a glass bottle, providing a hands-on, experiential approach to understanding fundamental atmospheric processes. Using accessible materials—warm water, a match, a glass bottle, a flashlight, and a balloon—children investigate the principle of evaporative cooling, a key mechanism in natural cloud formation. Through guided observation and active participation, the activity introduces learners to essential concepts in the water cycle, particularly the phase changes of water such as evaporation and condensation. By engaging in this inquiry-based experience, children develop early scientific reasoning skills, including hypothesis formation and cause-effect understanding, while fostering curiosity about observable natural phenomena (Big Bang STEAM, 2025).

3.2 STEAM Game-based Teaching Plan Inspired by Picture Books: Helping Children Understand the Meaning of Sustainability through Play

This teaching plan integrates picture book narratives with STEAM-based learning activities to help young children explore the concept of sustainability in a developmentally appropriate and playful way. Through engaging stories and hands-on group tasks, children are encouraged to think critically about environmental issues, design creative solutions, and develop lifelong eco-conscious attitudes. By aligning literacy with interdisciplinary problem-solving, this approach fosters curiosity, collaboration, and responsibility toward our planet (Duan, 2025b).

4. Conclusion

In sum, science education in early childhood holds transformative potential. When implemented thoughtfully and supported by confident educators and appropriate resources, it can foster both cognitive and social development (Shih, 2023; Shih, Wu & Chung, 2022). Future efforts in early education policy and teacher preparation should prioritize science learning as a foundational element of the curriculum, recognizing its role in shaping curious, competent, and collaborative learners (Chen, & Wu, 2024). Beyond its immediate developmental benefits, early childhood science education lays the groundwork for lifelong learning and scientific literacy. By engaging young children in inquiry-based exploration, educators nurture habits of mind such as curiosity, critical thinking, and evidence-based reasoning—skills that extend well beyond the domain of science. These early experiences not only demystify scientific concepts but also empower children to ask questions, seek answers, and make sense of the world around them. Moreover, integrating science into early learning environments promotes equity by providing all children—regardless of socioeconomic background—with opportunities to engage in high-quality STEM experiences from the outset of their educational journey. To achieve this, teacher education programs must emphasize science pedagogical content knowledge and equip educators with strategies to create inclusive, hands-on, and culturally responsive science experiences. Policymakers should also recognize the long-term impact of early science education on national innovation and workforce development. Investment in early science learning is not merely an enhancement, but a necessity for building resilient, informed, and collaborative future citizens.

References

[1]. Arndt, S. (2018). Early childhood teacher cultural Otherness and belonging. Contemporary Issues in Early Childhood, 19(4), 392-403. https://doi.org/10.1177/1463949118783382
[2]. Big Bang STEAM (2025). Simple and Engaging Science Experiments at Home: 13 Developmentally Appropriate Activities for Young Children. https://www.bigbangacademyhk.com/blog-zh/stem-experiments
[3]. Cabe Trundle, K. (2015). The Inclusion of Science in Early Childhood Classrooms. In: Cabe Trundle, K., Saçkes, M. (eds) Research in Early Childhood Science Education. Springer, Dordrecht. https://doi.org/10.1007/978-94-017-9505-0_1
[4]. Chen, M. K., & Wu, C. C. (2024). Integrating science, technology, engineering, and mathematics (STEM) into indigenous education for sustainability: The development and implementation of a curriculum based on disaster prevention for Young Children. Sustainability, 16(21), 9186. https://doi.org/10.3390/su16219186
[5]. Duan, V. (2025a). Engaging young children in scientific exploration: A 2025 guide to five creative fruit and vegetable-based learning activities. https://tw.toybrains.com/blog/tag/
[6]. Duan, V. (2025b). STEAM Game-based teaching plan inspired by picture books: Helping children understand the meaning of sustainability through play. https://tw.toybrains.com/blog/sensory-play-yirouhong
[7]. Gerde, H.K., Schachter, R.E. & Wasik, B.A. (2013). Using the Scientific Method to Guide Learning: An Integrated Approach to Early Childhood Curriculum. Early Childhood Educ J 41, 315–323. https://doi.org/10.1007/s10643-013-0579-4
[8]. Lorina (2025). Exploring science in early childhood. https://aussiechildcarenetwork.com.au/articles/childcare-articles/exploring-science-in-early-childhoodLorina
[9]. Shih, Y. H. (2021). Exploring F. W. Parker's notions regarding child education. *Policy Futures in Education*, *20*(5), 565-579. https://doi.org/10.1177/14782103211037483
[10]. Shih, Y. H. (2023). Case study of intergenerational learning courses implemented in a preschool: perceptions of young children and senior citizens. Educational Gerontology, 50(1), 11–26. https://doi.org/10.1080/03601277.2023.2216089
[11]. Shih, Y. H. (2025a). Early childhood science education: A reflection. International Journal of Latest Research in Humanities and Social Science, 8(6), 242–244.
[12]. Shih, Y. H. (2025b). Exploring the theoretical foundations of preschool STEM education: A constructivist perspective. RA Journal of Applied Research, 11(06), 507–510. https://doi.org/10.47191/rajar/v11i6. 10
[13]. Shih, Y. H. (2025c). Early childhood creativity education: Theoretical foundations and play-based practical strategies for educational renewal. International Journal of Latest Research in Humanities and Social Science, 8(6), 245–247.
[14]. Shih, Y. H., Wu, C. C., & Chung, C. F. (2022). Implementing intergenerational learning in a preschool: a case study from Taiwan. Educational Gerontology, 48(12), 565–585. https://doi.org/10.1080/03601277.2022.2053035