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Integrating Cultural and Local Contexts into Play Based Science Literacy for Preschoolers in Nanchang, China

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Abstract

Science literacy and play based learning is not conducive develop the program and lack of local culture and local context. Local cultural practices continue to be underutilised in science literacy. This study aim to explore the role of culture and local context in play-based science literacy learning that is rooted in the theories of preschool in promoting scientific thinking through play. Adopting a qualitative approach, the study applies library research and a comprehensive analysis of the recent literature about learning through play, science literacy and cultural and local context blending in preschool settings. The findings demonstrate that, though theoretical support and preschoool curriculum are executing in favor of play-based approaches and practice in Nanchang is restricted annually by overly prescriptive curricula, insufficient teacher education, and insufficient connection with local cultural content. This study emphasises the relevance of developmental theories includes Piaget, Vygotsky and Kolb as theorical bases from which to lead play based learning from culturally relevant play activities. These could be nature inspired play, art play, story-telling and role-playing based on local way of existence. The implications include that science-inquiry can be framed through the experiences of children in their everyday lives in culture providing a tool which heightens engagement, understandings, and identity. It stresses that teachers, policy makers, and curriculum developers need to embrace adaptive, sociallyculurally inclusive models that encourage culturally-embedded, play based pedagogy. The findings imply that reforms in teacher education, curriculum design and educational policy will be necessary to better accommodate place-based models for preschoolers. Key suggestions include integrating varied types of play into daily practice, creation of contexts dependent science curricula, and the fostering of family and community involvement to support long-term, culturally relevant preschool science literacy learning.

Keywords: Play based Learning, Science Literacy, Cultural and Local Context, Preschooler

Introduction

Early science literacy is crucial in developing preschoolers' curiosity about and observation of the world, as well as their learning of foundational science principles. Integrating cultural and local contexts into play based science literacy for preschoolers is a crucial yet often

overlooked aspect of preschool education, particularly in settings with unique cultural identities. As the importance of early science literacy grows, equipping preschoolers with foundational scientific thinking skills has become increasingly essential. However, many existing approaches fail to meaningfully connect with preschoolers' cultural and environmental backgrounds, resulting in lessons that may feel disconnected or irrelevant to their lived experiences. (Zhang & Romarzila, 2025; Yu, Liu, & Li, 2023).

The significance of this study includes filling an urgent gap in preschool education by focusing on the inclusion of culture and local contexts in play-based science literacy for preschoolers. It is a particularly valuable resource for preschool teachers, curriculum developers, and policymakers interested in creating an inclusive, engaging, and developmentally appropriate science curriculum. By connecting science to preschoolers' lived cultural experiences and local environments, study argue that science learning becomes more relevant and meaningful. It also helps preschoolers build stronger identities and ties to their communities. For education institutions, this research provides an outline for educating pre-service teachers with the skills to teach in a culturally responsive manner, and responds to the Chinese government's focus on the reform of preschool curricula across China and in other multicultural settings. In the end, this investigation provides evidence of how culture-based play science learning may be used to engage preschoolers, improve classroom practice, and promote lasting educational equity. According to Niu (2023) and Cheng et al., (2024), in preschool's science education, science literacy learning comes alive as preschoolers investigate their world through experiments, explorations, and inquiry based activities, and learn first hand how things work and why things happen. Play based learning was found to be particularly successful in this arena, providing developmentally appropriate ways for preschoolers to get involved in scientific thinking through play in nature, storytelling, acting and creative arts.

In Nanzhang, which is a common culture identity context in Jiangxi, preschool education is immersed in cultural and local context expression. These dimensions offer abundant possibilities for play based science literacy practice; however, they usually are neglected in preschool. Latest research and development trends show that, for better learning about scientific concepts and enhancing scientific literacy among preschoolers, researchers should situate scientific inquiry in the context of their life worlds and sociocultural environment (Zhou & Jiang, 2023; Yu, Liu, & Li, 2023). This study responds an urgent need to provide a science curriculum that builds on the everyday experiences of preschoolers by finding scientific learning in culturally relevant, play based, approaches. By doing so, not only does science education become more effective, but cultural identity is reinforced and inclusive and developmentally appropriate pedagogy encouraged. It is important to recognize how locally-embedded play is a potentially powerful vehicle to support preschoolers's scientific inquiry and that this understanding informs both comprehensive and responsive models of preschool education.

This paper explores the ways of using a culture and local context in play based approach to enhance preschool children's science literacy in Nanchang that bridges developmental theory.

Research Methodology

This study used a qualitative with library research and recent literature review relating to play-based learning, science literacy and cultural and local context integration in preschool to analyze and report the findings. This method consists of a systematic review, analysis, and synthesis of journal articles and theoretical works. The literature review shows the trends in terms of theory, approach, strategies and research findings in relation to play-based science literacy in different culturally diverse preschool education contexts with a specific emphasis on Chinese context. Through the integration of both international and local studies, researchers intend to develop a deep understanding of the ways in which a play based pedagogy can be tailored to meet the Nanchang cultural and local context.

Theoretical Foundations

Theoretical underpinning is important to explain how play-based approaches facilitate the development of science literacy in preschool. Many developmental and educational theories contribute to understanding of how preschoolers learn as they play and interact. This section provides an overview of the theoretical perspectives that underpin play based science literacy learning, such as cognitive developmental theory, sociocultural theory, cultural-historical theory, experiential learning, constructivism. These frameworks highlight the significance of active interaction, social interaction, and cultural context of the learning as influencing preschoolers' learning. And by rooting play-based science instruction in such well-grounded theories, educators are able to provide purposeful, developmentally appropriate learning experiences that immerse the preschoolers in inquiry, creativity, and a close connection to the natural environment and culture (Piaget, 1962; Vygotsky, 1978; Kolb, 1984; Bruner, 1966).

Theories that support play-based learning are approaches that help researchers make sense of the role of play and social interaction in the learning and development of preschoolers. For Piaget, play is a key vehicle through which preschoolers incorporate new experiences into their existing mental schemas; imaginative and symbolic play in particular encourages abstract thought and problem solving (Piaget, 1962). Relatedly, the sociocultural perspective on learning, as suggested by Lev Vygotsky, emphasizes the importance of social interaction in learning, as well as the Zone of Proximal Development (ZPD), where preschoolers make cognitive advancements with the help of more competent peers or adults (Vygotsky, 1978). For Vygotsky, play is a leading activity in development and language supports cognitive and social development as preschoolers manipulate language, take on roles, and express emergent ideas collaboratively. Building upon this theory, cultural-historical theory by Vygotsky's ideas. Fleer (2010) argues that development happens within specific cultural and historical contexts. Within this framework, play is both a site of cognitive exploration and a mechanism of internalizing cultural tools, technologies, and values. In these playful and supported activities preschoolers participate in culturally significant practices that influence their cognition and emerging self.

From the historical perspective of early scientific investigation, experiential learning and constructivism also provide a lens through which preschoolers are learning through play. Kolb's (1984) theory of experiential learning mentioned that preschoolers learn best when they have hands-on, concrete materials with which to manipulate, experiment and reflect. Constructivists follow the work of Piaget and Vygotsky, asserting that understanding is constructed by the learner rather than transmitted (Bruner, 1966). Preschoolers' emergent

scientific thinking is built as they engage in exploratory play: by making and testing hypotheses, trying stuff out, and solving problems cooperatively. Considered from a cultural-historical perspective, scientific investigation is not to be identified as a cognitive activity per se, but a process being embedded into culture and society. Preschoolers engage in inquiry-based learning as members of a community, using common tools and sharing language and practices reflective of their sociocultural context. That way, play becomes a potent integrative context where perceptional and cognitive development, second language acquisition and cultural receptivity combine to facilitate a balanced development of the preschoolers.

The application of this theory to China preschool classrooms, with examples of how play is being used to facilitate science literacy learning. China in play-based pedagogy for preschooleers as an instance of an emergent expression of Piaget's cognitive developmental theory as much as a move toward prescj\hool education, valuing more explorative play where symbolic play becomes and gives the languages for assimilation and accommodation. These models of preschooleers interacting with and testing the world including materials through play and trial and error are based on working from hands-on experience over time ultimately to develop understanding (Niu, 2023). Guided play settings provide examples of Vygotsky's sociocultural theory in action as teachers scaffold preschooleers' thinking within their Zone of Proximal Development, encouraging them to move from making sense of surface-level phenomena to gaining a more advanced understanding of an idea. This is consistent with studies highlighting the role of teacher mediation in promoting meaningful learning during play (Cheng et al., 2024).

Kolb's learning cycle is also represented in the classroom as preschooleers' activities consists in observing some natural materials, rethinking the results and actively modifying their behavior in some future experiment. Current curriculum models more readily facilitate the science play of component structures including the processes above though iterative, hands on experiences, in part because research supports the use of experiential frameworks in curriculum design (Mirshamsi et al., 2024). The constructivist tenets of preschool child-initiated inquiry and coconstruction of knowledge are also being operationalized through symbolic role play and thematic block play to provide children with opportunities to express and check out ideas in science that are personally and culturally meaningful (Cai et al., 2022).

These theories collectively are now guiding play-based science literacy development in China. By establishing practice on theory, preschool educators are beginning to develop culturally responsive approaches to play that promote inquiry, reasoning and communication whilst also comparing favourably with national policy agendas and international standards for early learning.

Cultural and Local Context of Nanchang, Jiangxi

Nanchang's rich cultural heritage exemplified by landmarks like the Teng Wang Pavilion and Wanshou Palace can serve as powerful educational tools to enhance science literacy in preschoolers. Integrating these local sites into early science education helps preschoolers connect scientific concepts with their immediate environment. For example, exploring the architecture, ecosystems, and materials of Teng Wang Pavilion can introduce preschoolers to basic ideas in engineering, ecology, and materials science in a culturally grounded way (Li, 2024). Wanshou Palace, as a symbol of historical restoration and cultural continuity, presents

opportunities for preschool teachers to teach about preservation, weathering, and sustainability, encouraging scientific curiosity while fostering respect for local traditions (Qi & Sikka, 2024). Activities might include experiments with natural building materials, discussions on time and change, or learning about local plants used in traditional construction. Moreover, universities like Nanchang Jiaotong Institute have shown how cultural heritage promotion can be integrated into prescxhool educational programs (Hu et al., 2024). Preschool science programs can mirror this approach by incorporating hands-on, inquiry-based learning using local crafts, farming traditions, or environmental features thus supporting both scientific thinking and cultural identity from an early age.

To develop evidence-based key elements of a science literacy intervention, it is necessary to understand Nanchang's local and cultural context, which would facilitate culturally-situated play-based science literacy in preschool education. As an ancient city with a deep-rooted historical and cultural memory, the early childhood education landscape in Nanchang is influenced by traditional values, story telling traditions, and civic symbols. Simultaneously, national reform efforts in education are calling for more inquiry-based and experiential learning, consistent with international trends. Yet, while interest is rising, formal science learning through play is underdeveloped as evidenced by the lack of flexibility of curricula, pressure for academic achievement, and dearth of localized frameworks. Science literacy learning within the context of cultural narratives, customary practices and locally-relevant pedagogical norms of Nanchang. Through taking challenging and promising of this particular context, this section emphasizes the need to reconcile cultural identity and scientific inquiry for meaningful and developmentally appropriate learning in preschools (Gan, 2023; Zhou & Jiang, 2023; Yu, Liu, & Li, 2023; Niu, 2023; Lai & Pharanat, 2024).

Although there are currently few clear programme standards for play-based science literacy learning in preschools in Nanchang and China more generally, particularly not in the field of how to implement the curricula, the curriculum guides there stress the importance of play based learning, hands on experiences, and curriculum reform. These priorities promote a move by preschool educators away from formal, academic instruction toward more child focused and exploratory methods. Emphasising: The present initiatives serves as a model for infusing open ended play with observing, problem solving, and early science thinking. Although this practice has not been widely adopted in Nanchang, such an initiative serves as a useful model for reform and may help to link the science content with child-initiated discovery (Niu, 2023; Lai& Pharanat, 2024).

As interest is growing, there are different practices between institutions due to the absence of a national curriculum framework in early science and literacy practices. A majority of preschools still rely on adult-led instruction, plenty of school readiness drills, and little time for inquiry. Factors that contribute are teachers' short preparation time, pressure to reach academic targets, and a history of 'tell', not 'show', in the classroom.

Nanchang's educational setting is informed by traditional pedagogy culture. Traditional holidays, folktales and national and cultural symbols are often included in pre existing preschool programs to foster a sense of national identity and national values at an early age. Public education for civic consciousness and cultural continuity vigorously relies on the preservation of historical sites (Yu, Liu, & Li, 2023). But these elements of culture are seldom

incorporated into formal science education. The division between the cultural and scientific content reduces the potential for integrative learning transfers that correspond to preschoolers' local realities and backgrounds.

The recent research has focused on the value of traditional cultural narratives and practices in play based learning settings. For instance, naturalistic aspects of traditional stories relate lessons regarding basic science such as weather, animals, and seasons. Also, cultural routines of everyday life including planting, cooking, craft making surely provide spaces for preschoolers to observe, group and try out, which are consistent with early science learning objectives (Gan, 2023; Zhou & Jiang, 2023).

Connecting culturally responsive teaching and inquiry-based instruction in science in the preschool classroom, as educators and future educators, sends a powerful message for preschool education in Nanchang. To foster this type of approach, greater emphasis is required in three areas: the creation of place-based curricular standards, teacher professional development that targets the ability of teachers to use local communities to reinforce scientific concepts and the development of learning contexts that bridge cultural identity and science inquiry. Such efforts could help build integrated, contextually rich learning experiences through which preschoolers can develop curiosity, cultural understanding, and basic literacy during early childhood.

Types of Play-Based Activities Supporting Science Literacy

Landmarks like the Teng Wang Pavilion and Wanshou Palace show how Nanchang's rich cultural heritage can be used to teach preschoolers about science literacy. By incorporating these local places into preschool science lessons, preschoolers can connect basic scientific ideas with the culture around them. For instance, preschoolers can learn about basic concepts in engineering, materials science, and ecology by looking at the structure, materials, and surroundings of Teng Wang Pavilion in a way that is meaningful to their culture and community (Li, 2024). In the same way, Wanshou Palace gives preschool teachers a chance to teach ideas like preservation, weathering, and sustainability, while also encouraging respect for cultural continuity and tradition (Qi & Sikka, 2024). Nanchang Jiaotong Institute have shown how to include cultural heritage promotion in learning by getting preschoolers involved. This suggests that preschool programs can use culturally relevant, inquiry-based activities in the same way (Hu et al., 2024).

To make learning fun and appropriate for preschoolersage, it's important to know what kinds of play help preschoolers learn about science. The best way to teach science to preschoolers is through play-based methods that let them explore, ask questions, and make sense of the world around them. Exploratory play, structured play, manipulative play, nature play, and art play are some of these approaches. Each one helps with a different part of scientific thinking, like observation, classification, experimentation, and representation. Exploratory play, like sensory tables and nature walks, gets preschoolers to interact with things and the outdoors in a hands-on way. In Nanchang, this kind of play could mean touching the rough surfaces of old stone walls or looking at plants near historical sites, which would encourage learning through questions (Niu, 2023). Structured play, like making models of local landmarks with the help of a teacher, helps preschoolers learn how to think in a systematic way and how to reason scientifically (Wang & Ng, 2022).

Playing with things, like sorting old artefacts or putting building blocks together to look like cultural structures, helps preschoolers learn how to classify things and use logic, which are important skills for being scientifically literate. Research in China has shown that block-based activities can greatly help preschoolers develop their language and understanding of concepts, which suggests that science and literacy can be taught together (Cai et al., 2022). Nature play helps preschoolers learn about the environment by doing things like watching the weather, collecting leaves, or noticing how things change with the seasons. These activities help kids develop their observation skills and learn about environmental science at a young age. These activities also help preschoolers learn to read and write when they talk about them or draw them. Art play helps preschoolers connect their creative side with their scientific side by letting them show what they learn through pictures. Drawing a flower on a field trip or painting the differences in temperature using warm and cool colours are both ways to encourage scientific thinking and artistic expression (Aguilar, 2024).

Different types of play can help preschoolers learn about science in ways that are important to their culture. Play-based education is a developmentally appropriate, culturally responsive, and scientifically sound way for preschoolers to learn about and understand their world when it is part of a strong curriculum and taught by teachers who know how to scaffold learning.

Integration Strategies

Integrating play based science literacy into concrete classroom practice is not possible merely by offering playful activities in the classroom, and instead necessitates that preschool teachers plan for such instruction, enact that instruction using culturally relevant approaches to science literacy, and collaborate with others across multiple levels for instruction integration. In preschool education, where the developmental process and cultural values here converge, the playful science literacy must be contextually situated and pedagogically justifiable. In this section, strategic considerations for incorporating science within the context of preschool play are then detailed, with particular emphasis given to teacher involvement, challenges related to structure, and the importance of including families and communities. Taken together, these elements constitute an inclusive configuration for preschoolers to engage in developmentally and culturally relevant science learning in varied preschool contexts (Zhou & Jiang, 2023; Yu, Liu, & Li, 2023; Zhang, Li, & Disney, 2023).

The studies by Romarzila et al. (2023) and Romarzila (2023) explore the creation of an interactive science literacy model tailored for Chinese children through the use of folk stories and dialogic reading techniques. These works emphasize how integration culturally relevant narratives with interactive questioning strategies can effectively engage preschoolers and enhance their science comprehension. The model encourages active participation, critical thinking, and a deeper connection to scientific content by embedding it within familiar and meaningful storytelling formats. Together, the studies highlight the potential of dialogic reading and traditional tales as powerful tools in science education for preschoolers.

Successful integration of play-based science literacy in the preschool is dependent on the developmentally appropriate practice and the cultural relevance and local context in a community. Science through play can be integrated as scientific inquiry is integrated into hands on experiences in the classroom, with exploring of nature, sensory play, and other manipulations of entities. Preschoolers make observations, predict, classify, and experiment as we guide them through purposeful play. Teachers can foster it by promoting preschoolers'

inquiries, documentation of findings, and ideas communicated through drawing, modeling, and storytelling science-infused language and literature experiences. Play-based approaches have demonstrated how unstructured yet intentionally mediated environment can support preschoolers' inquiry, and make learning grounded in locally familiar contexts (Niu, 2023).

The role of the preschool teacher is key in these models. Preschool teachers have to be followers and leaders at once, as well as reflectors and observers. Their work is to organize a rich environment and scaffold children's thoughts with careful questioning, collaborative documentation, and dialogic reflection. Research reports that without adequate training teachers might find it difficult to link exploratory play with scientific ideas or fail to capitalise on opportunities to extend inquiry (Zhang, Li, & Disney, 2023). Professional development is therefore necessary to support confidence and competence in integrating science and play. However, integration is difficult due to constraints such as limited exposure to science pedagogical approaches in their pre-service teacher preparation programs, high academic pressure from students' parents, and restrictive curriculum guidelines. In China preschools, studies have shown that preschool teachers have often found difficultly of reconciling traditional academic expectations with play based pedagogy when implementing child-centred science instruction (Wang & Ng, 2022). Overcoming these obstacles through systemic interventions may be needed, such as curriculum reform includes decrease content, integration learning and peer supporting models (Peng et al., 2022).

Family and community involvement also enhances the cultural appropriateness and longevity of scientific learning within preschool environments. Weaving local knowledges such as growing food seasonally, herbal medicines, local crafts, or weather lore into science play helps preschoolers connect to scientific ideas in their lives. Local myths or festivals or events generated out of such beliefs can also act as windows to practices that aid understanding and a channel for questioning and relating storytelling and natural phenomena witnessed in their eco-system. Research indicates that the cultural cognition and knowledge of science of preschoolers are enhanced when their families engage with them in shared inquiry, including take-home investigations, storytelling journals, and neighborhood nature walks (Zhou & Jiang, 2023; Yu, Liu, & Li, 2023). Partnering with cultural institutions, such as science centers or museums, also increases access to hands-on, context-rich learning, within and outside of formal school settings, and may enhance community school partnerships. Prteschool educators, families, and communities work together, play-based science literacy has the potential to be a powerful and democratic vehicle for developing preschoolerss understanding of science grounded in their lived experiences and cultural backgrounds.

This section underscores the importance of designing developmentally and culturally appropriate play based science literacy in the preschool curriculum. It describes key approaches, such as immersing preschoolers in science through daily, playful activities such as investigating nature, expressing themselves creatively, and the role of teacher facilitation that is based on the dynamic of teacher's facilitation of preschoolers' inquiry and intentional scaffolding. The importance of preschool teacher training is emphasized as key, especially to counteract issues related to inflexible curricula, and inadequate pedagogical background. The section also highlights the value of including families and communities in science play by using local traditions and resources to further learning. Combined, these various approaches create

a comprehensive culturally responsive framework for supporting early science literacy based on preschoolers' experiences, contexts, and cultural identities.

Discussion

The results of this study support the importance for preschoolers to experience culturally relevant, play based approaches in early science literacy instruction, especially in a local context such as Nanchang City, Jiangxi, China. Founded on established developmental theories and supported by recent educational reforms in China, a play-based approach to learning has been recognized as an empirically sound, developmentally appropriate strategy for cultivating early scientific thinking. Synthesis of research suggests that preschoolers at play can witness, question, hypothesize, and build knowledge from authentic experiences; when they are offered opportunities to play in different ways for exploratory, manipulative, nature, and art play, preschoolers learn from the process (Niu, 2023; Aguilar, 2024; Cai et al., 2022).

These practices would provide rich, but seldom employed, resources from the cultural context of Nanchang to support context learning in science literacy. Although recently in China, the policies have been stringent on play based learning, the actual application is uneven. Stringent curriculum requirements, the absence of scientifically sound science education models, and minimal teacher training are some of the factors that still limit innovation in preschool environments. Although theories of development includes Piaget, Vygotsky, Kolb, and Bruner highlight the centrality of play, experiential, and sociocultural significance (Teale, 2024), the bridge from theory to practice demands thoughtful preparation and planning, localized curricular interpretation, and sustained professional support (Cheng et al., 2024; Mirshamsi et al., 2024).

The literature also emphasizes the importance of preschool teacher facilitation. Preschool teachers must go beyond establishing inquiry ridded contexts and serve as reflective guides who can scaffold preschoolers' learning, make links between cultural content and science ideas, provoke and support language development in questions and documentation (Zhang, Li, & Disney, 2024). Moreover the involvement of the local knowledge of the community and the family participation significantly contribute to arouse the interest and understanding of science to children. Practices, like take-home experiments, a storytelling journal, or culturally endemic nature explore, can be infused with authenticity, driving preschoolers' inquiry in ways to both strengthen family and preschool relationships and practices (Zhou and Jiang, 2023; Yu, Liu, & Li, 2023).

These findings suggest that it is necessary and achievable for science literacy in Nanchang's preschools to be realized through culturally responsive play. But it needs systemic support with teacher training, locally produced curriculum and more preschools linked with communities. The intersection of theory of development, cultural context and hands on pedagogy provides a strong theoretical base for preparing preschoolers to acquire scientific culture without doing violence to their culture. This work must now be followed by piloting of these approaches in practice and in assessing their long-term effect on the cognitive and cultural development of children.

Conclusion

This research illustrates the important role of culture and local context, play-based learning for expanding the early science literacy for preschoolers in Nanchang, China. Founded on developmental theory and recent educational reform, the inclusion of scientific inquiry within play, provides preschoolers to explore, question and make sense of their world in a meaningful context. Nevertheless, barrier such as a fixed curriculum, lack of teacher training, and disjuncture between daily cultural practices and formal science instruction still prevent such efforts from being widely employed. By connecting developmental theory and local culture, preschool education can be more compelling, equitable, and supportive of core science learning.

Implications

The results of this study have important theoretical, practical and policy implications for preschool science education. This study demonstrates the power of well-established learning theories including Piagetian based learning theory, Vygotskian theory of socio-cultural education, Kolb's experiential learning, and cultural-historical theory with respect to the development of effective play based and .science literacy learning. It supports the notion of science literacy learning in the preschool as a social and cultural practice, rather than at a cognitive level in isolation. The addition of play based and cultural mand local contexts reflects a theoretical premise that learning is most meaningful within context. By implementing these theories can go beyond abstract teaching to a more experience learning, socially connected version of science literacy learning.

At the level of pedagogy, it underscores the importance of preschool teachers' flexible and responsive way of teaching. Teachers need tools to support different modes of play includes exploratory, nature-based, and art-integrated play for implicitly designed to contribute to scientific thinking, in ways that are aligned with the age of the children. These results also indicate the role of preschool teacher in the nature of science in relation to science content as seen in culturally meaningful activities, for instance, traditional festivals, folklore, and local environmental practices. It also supports further partnership between preschools and families, motivating educators to develop activities that take learning beyond the school building and the home to the community, connecting children's worlds to the preschool curriculum.

At the policy level, this study recommends policy-related changes to support more curricular flexibility and cultural responsiveness in preschool science. National and state education leaders should update existing curriculum standards to explicitly reflect the importance of play-based, inquiry-based, and culturally infused science learning. Policies should also require continuous teacher training in play based pedagogy and science facilitation, especially in underprivileged or culturally diverse areas. In addition, investment and support should be given to those efforts that build family and community engagement, such as local science festivals, intergenerational narrative work and partnership school-community work. Such policy changes would ensure a more inclusive, relevant and sustainable mode of science teaching that is consistent with contemporary best practice in science education throughout the world, and indigenous educational imperatives.

Recommendations

For aiding the successful execution of play based science literacy in culturally expansive settings such as Nanchang, a number of focused suggestions are made. Diverse types of play from exploratory, to manipulative, natural, structured and art play should be embedded into daily classroom practices by preschool teachers. These should be based on locally appropriate materials and cultural stories that make science learning relevant and meaningful for preschoolers. Curriculum developers are encouraged to design frameworks that explicitly link science inquiry to local traditions, local knowledge, and the daily experiences of preschool that reflect local environments. It is critical that teacher preparation programs incorporate courses or learning modules that are focused on developmental theory, cultural-historical perspectives and inquiry-based instruction that could empower prospective teachers to effectively support science learning through culturally relevant play. Future work should also investigate long-term effects of culturally-embedded play-based science education on preschoolers' scientific reasoning and problem-solving ability. The next such investigations will also need to further explore successful family and community engagement models to articulate more explicitly how such partnerships can support and extend science literacy in preschool encompassing varying cultural contexts.

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