Parental Perspectives on Early Science Education for Preschool Children

[1]Nadia Shahira Amiruddin, [2]Siti Nur Nadirah Ibrahim

[1]Early Childhood Education Department, Sultan Idris Education University

[2]Early Childhood Education Department, University of Selangor

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ABSTRACT

Early Childhood Education is pivotal in developing children's cognitive abilities and scientific literacy. This study investigates parents' perceptions of Early Science education in preschool settings using a quantitative research method. A survey was conducted among 342 parents, and the data were analyzed using SPSS version 29. The results revealed a strong consensus on the importance of Early Science education, with a mean score of 4.60 (SD=0.490). Parents also acknowledged the necessity of providing exploratory activities and resources at home to support scientific literacy. These findings underscore the vital role parents play in fostering scientific curiosity in young children and highlight the need for collaboration between educators and families to enhance Early Science learning experiences.

Keywords: Early childhood, Early Science, perspectives, home learning, Science Literacy

NTRODUCTION

Early childhood science education is essential in the development of children's innate curiosity and sensitivity to their environment. Early exposure to science ideas enhances the mind and problem-solving skills, creating a foundation for lifelong learning. Parents, as immediate caregivers, are central to children's early learning experiences. Understanding their perceptions regarding early science education is essential in developing effective teaching strategies that resonate with home learning environments.

Various early science education activities have been identified through recent studies. For example, outdoor classrooms, such as beach-based kindergartens, have been discovered to enhance children's science and mathematics knowledge with first hand experience (Herald Sun, 2024). Furthermore, the use of technology like AR in preschool science education has gained attention. Cheah et al. (2024) set in a study that parents' knowledge and attitudes have a positive impact on their attitude toward adopting AR technology during early science education. This study aims to explore parents' perceptions regarding the importance of early science learning in preschool. Specifically, it explores their awareness, involvement, and felt need for early science learning, particularly in home-based inquiry activities. The findings enlighten us on how parents can be employed to enhance scientific literacy among preschool children.

METHODOLOGY

A quantitative study design was employed to systematically examine parental perceptions of early science education. A standardized questionnaire was constructed and administered to preschool parents to gather pertinent information. The questionnaire included closed ended Likert-scale questions to allow for consistency in response and ease of statistical analysis.

The survey aimed to capture three significant dimensions:

1. Parents' perceptions of science education in early childhood, including their knowledge and beliefs about its importance.

2. Provision of play and discovery spaces in home, identification of whether parents facilitate an environment conducive to hands-on experimentation and discovery.

3. Parental embracement of early science instruction, including willingness to provide materials and perform experiments.

342 responses in total were received, which gave a sufficient number for statistical analysis. Descriptive statistics were applied, calculating mean scores and standard deviations for all items to indicate trends and variability in parental response. To ensure the reliability of the questionnaire, Cronbach's Alpha was used to assess internal consistency. Cronbach's Alpha is a statistical measure that determines how closely related a set of items are within a scale. A higher value, typically closer to 1, indicates strong reliability, meaning the survey items effectively measure the same underlying concept.

In order to uphold ethical standards, informed consent was first sought from all participants prior to data collection. The research followed confidentiality guidelines, with responses kept anonymous.

RESULTS AND DISCUSSION

The survey results indicate a high level of parental awareness and support for early science education:

N o	Item		Percentage (%) (N:342)				Mean	SD
		SN A	NA	PA	A	SA		
1	Knowledge of Early Science Education	0 (0)	0 (0)	0 (0)	76.9 (256)	23.1 (79)	4.23	.422
2	Provision of Play and Exploration Spaces	0 (0)	0 (0)	2 (7)	74.9 (256)	23.1 (79)	4.21	.456
3	Importance of Early Science Education	0 (0)	0 (0)	5.3 (18)	81.6 (279)	13.2 (45)	4.08	.422
4	Development of Scientific Literacy at Home	0 (0)	0 (0)	0 (0)	39.8 (136)	60.2 (206)	4.60	.490
5	Provision of Materials for Experiments	0 (0)	0 (0)	0 (0)	60.5 (207)	39.5 (135)	4.39	.490
6	Provision of Materials for Experiments	0 (0)	0 (0)	0 (0)	51.8 (177)	48.2 (165)	4.48	.500
7	Reflection After Experiments	0 (0)	0 (0)	0 (0)	54.4 (186)	45.6 (156)	4.08	.496

Knowledge of Early Science Education: 76.9% of parents agreed, and 23.1% strongly agreed that they are knowledgeable about Early Science education, with a mean score of 4.23 (SD=0.422). Increased awareness of the importance of early science education in early childhood has led parents to actively seek information. Many parents today have access to resources through social media, parenting blogs, and early childhood programs. Research by Morgan et al. (2016) found that parents who are aware of the benefits of early science education are more likely to engage their children in scientific activities at home.

Provision of Play and Exploration Spaces: A significant majority of parents reported providing play (mean = 4.21,

SD=0.456) and exploration spaces (mean = 4.08, SD=0.422) in their children's rooms. Parents recognize that play-based learning is essential for cognitive and social development. Many homes provide dedicated play areas to enhance learning through exploration. Weisberg et al. (2016) argue that play is a crucial element in early science learning, as it helps children develop problem-solving skills, curiosity, and creativity.

Importance of Early Science Education: All respondents agreed (39.8%) and strongly agreed (60.2%) on the importance of early science education, yielding the highest mean score of 4.60 (SD=0.490). The growing emphasis on early science education in global curricula has likely influenced parental attitudes. Parents understand that early exposure to science builds critical thinking skills and prepares children for future academic success. According to the National Science Teaching Association (NSTA, 2014), early science experiences lay the foundation for later learning by fostering inquiry-based thinking and problem-solving skills.

Development of Scientific Literacy at Home: Parents acknowledged that scientific literacy can develop through exploratory activities at home, with a mean score of 4.39 (SD=0.490). Many parents believe that scientific literacy can develop naturally through everyday activities like cooking, gardening, and observing nature. Parents see these informal experiences as key to helping children understand basic scientific principles. Vartiainen et al. (2021) suggest that parental involvement in science-related discussions at home significantly enhances children's ability to think scientifically.

Provision of Materials for Experiments: A majority agreed (51.8%) or strongly agreed (48.2%) on the importance of providing materials for experiments, with a mean score of 4.48 (SD=0.500). Hands-on experiments are recognized as an effective way for children to understand science concepts. Parents may also see science experiments as fun and engaging activities that strengthen parent-child bonding.

Reflection After Experiments: Parents recognized the need for reflection after experiments, with a mean score of 4.08 (SD=0.496). While parents value reflection, they may lack strategies or time to effectively engage children in post experiment discussions. Some may not fully understand how to facilitate reflection beyond observing the outcomes of an experiment.

These findings align with previous research emphasizing the role of parents in supporting early science education. The high level of agreement on the importance of early science education suggests that parents are aware of its benefits in fostering cognitive development and scientific literacy. Furthermore, the acknowledgment of home-based exploratory activities indicates that parents recognize their role in providing enriching learning environments.

To further illustrate key points, here are some examples of home-based science activities that have been successfully implemented. One of the activities is the baking soda and vinegar reaction. Through this activity, parents can engage children in a simple yet exciting experiment by mixing baking soda with vinegar to create a fizzy reaction. This experiment allows children to observe chemical reactions in an engaging and interactive manner.

Next is the sink or float experiment. By encouraging children to test various household objects in water, parents can introduce basic physics concepts such as density and buoyancy. This hands-on activity enables children to predict and observe outcomes, fostering critical thinking skills.

Apart from that, we also conducted the growing plants experiment. Parents can guide children in planting seeds and observing their growth over several weeks. This activity teaches children about plant life cycles, the importance of sunlight, water, and soil nutrients, and introduces basic biological concepts in an experiential way.

Lastly, there is the magnet exploration. Parents can provide children with different objects to test their magnetic properties, helping them understand the fundamentals of magnetism. This simple yet effective activity introduces physics concepts through hands-on discovery and exploration.

Engaging children in simple yet meaningful science experiments at home can greatly enhance their curiosity

and understanding of scientific concepts. The example of activities provide hands-on learning experiences that promote critical thinking, problem-solving skills, and a deeper appreciation for science. By incorporating these activities into daily routines, parents can play a vital role in nurturing their children's scientific literacy from an early age. Ultimately, fostering a love for exploration and discovery at home lays a strong foundation for lifelong learning in science.

CONCLUSION

The research affirms that parents identify the importance of early science learning and its central role in childhood development. Parental consensus in the value placed on investigative work and resource provisioning is high, reflecting a very strong intention to assist their children's scientific learning at home. This active parent engagement implies that early science experience is not just appreciated but indeed actively promoted across many homes.

However, although parents understand the need for learning through experience, there is still wide scope for enhancing guided reflection and discussion after experiments. Achieving a stronger working relationship between parents and teachers is of the utmost importance to enhance these learning opportunities so that the children not only benefit from discovery play but also develop enhanced scientific thinking and inquiry skills.

Follow-up research could then explore effective approaches to engaging parents more positively in their children's science education. These could include workshops, web-based resources, and interactive parent mentoring programs that allow parents with strategies to facilitate science learning at home. In addition, use of technology-based learning materials (e.g., teaching apps, computer experiments) and outdoor learning areas could be explored as effective avenues for progressing early science education. Investigating how socio-economic status impacts parental engagement with science learning would also be very enlightening to inform the design of inclusive and accessible educational programs.

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