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Improving Early Childhood Cognitive Skills Through Geometry Pouch Media

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ABSTRACT

This study aims to improve the cognitive abilities of early childhood through shape and color guessing games using flannel-based geometry pouch media. This media is designed to introduce basic geometry concepts interactively, integrating the principles of learning through play. The research method used is a qualitative study with a literature review approach. The results show that the flannel-based geometry pouch media is effective in enhancing children's cognitive abilities, especially in recognizing shapes and colors, while also creating a fun and interactive learning experience for students. This literature review does not involve direct interaction with research subjects, but rather emphasizes the analysis of reading materials and written information.

Introduction

Early Childhood Education (ECE) serves as a critical foundation for the development of children aged 0–6 years. This period is often referred to as the "golden age" because children are highly sensitive to various stimuli (Setiani, 2013). ECE aims to provide educational stimulation so that children are optimally prepared to progress to the next level of education.

Education for preschool children requires a special approach through engaging play activities that directly involve the child. The goal is for children not only to understand concepts but also to enjoy the process and be inspired to enhance their creativity (Mukhlis, 2013; Sarasehan et al., 2020). ECE educators need to determine appropriate learning strategies and tools that align with children's characteristics to achieve effective and enjoyable learning (Supena & Hasanah, 2020).

Learning media plays a very vital role in supporting the success of education in early childhood. Interesting, innovative, and developmentally appropriate learning tools or resources can increase children's motivation and ability to learn. Research has shown that well-designed learning media can stimulate children's development, including their cognitive aspects. For example, a study by Yunastiti (2015) found that twister games can improve children's understanding of geometric concepts in group B.

According to Wasik (in Hrp et al., 2018), geometry concepts for early childhood involve identifying shapes, analyzing structures, and grouping geometric images. One effective tool for teaching geometry concepts is the geometry pouch, made from flannel material and used to help children recognize various geometric shapes such as circles, triangles, squares, and diamonds. Geometry pouches involve children in fun manipulative activities, enhancing their thinking abilities while also fostering imagination and creativity. Thus, geometry pouches can improve children's learning outcomes by increasing their interest and

enthusiasm for learning.

This study aims to develop the geometry pouch as an effective instructional tool to improve the thinking abilities of kindergarten-aged children. The research focuses on how this tool can help children recognize and understand geometric shapes in a fun and interactive way. The results of this literature review are expected to provide insights and references for ECE educators in developing innovative and effective learning media to enhance children's thinking skills.

Methods

This research falls into the category of qualitative research using a literature review method. This method involves tracing and evaluating relevant theoretical references to understand the issues being studied. According to Zed (2008), a literature review is a series of activities involving the collection of data from various literary sources through reading, note-taking, and analyzing materials related to the research.

This literature review does not include direct interaction with research subjects but emphasizes the analysis of reading materials and written information. Nuryana et al. (2019) stated that a literature review is a method used to solve problems through the examination of sources that are processed into text, including the analysis, comparison, summarization, and categorization of textual sources.

The information in this study was obtained from scientific articles and literature related to encouraging cognitive development in early childhood using geometry pouch media. This literature review aims to

provide a comprehensive overview of the current state of knowledge on the topic of geometry education for young children. The review was conducted by examining and assessing relevant articles—using 10 articles related to the topic, published within the last five years (2018–2023), and utilizing the internet to obtain additional sources.

Results and Discussions

The findings from ten studies collectively highlight the positive impact of various learning media on the cognitive development of early childhood, especially in recognizing geometric shapes. From the use of hands-on materials like rainbow stones and block play to digital innovations such as geoboard applications and ethnomathematics-based content, each study supports the idea that interactive, contextual, and engaging media foster better understanding and retention of geometric concepts. Whether grounded in cultural context, technology, or natural materials, the implementation of learning tools not only improves shape recognition but also enhances motivation, fine motor coordination, and active participation among young learners. These studies offer compelling evidence for educators to incorporate diverse and developmentally appropriate media in early childhood education.

No.	Title	Year	Authors	Research Findings	Implementation Method

1	**Magic Board Media in Geometry Learning**	2022	Anggia Maghfiro Safitri, Ika Fitri Apriani	The use of magic board media significantly enhances students' understanding of geometric concepts. Students became more interested and actively engaged in learning through hands-on activities such as drawing and manipulating geometric shapes.	Teachers used the magic board as a visual aid. Students drew various shapes on the board individually or in groups and were challenged to create new shapes in a fun, engaging environment.

2	**The Use of Ethnomathematics-Based Geometry Learning Media**	2017	Sari, A. W., Farida, F. G. Putra	Ethnomathematics-based media effectively improve understanding of spatial and geometric concepts. Relating materials to local culture makes geometry more relevant and meaningful.	Teachers integrated local culture, using traditional crafts or local architecture. Activities included group discussions and creative projects to model shapes based on cultural elements.
3	**Improving Geometry Learning Quality with ICT-Based Learning Media**	2016	L. P. I. Harini, I. M. Widiartha, N. A. Sanjaya	ICT-based learning significantly improves understanding of geometry compared to conventional methods. Students showed greater motivation and better scores.	Teachers received training and used interactive apps and geometry software to explain concepts like area, volume, and shape properties, supported by simulations and hands-on practice.

4	**Analysis of the Use of Learning Media to Facilitate the Introduction of Geometric Shapes**	2022	Maria Ulfah Sopany, Taopik Rahman, Edi Hendri Mulyana	Media such as worksheets, posters, and magazines help introduce geometry to young children but often fail to maintain their interest. More engaging media is needed.	Teachers developed hands-on tools and applied game-based strategies like the "Shape Hunt" to keep children physically active while identifying shapes in their surroundings.
5	**Development of GoGeo Media for Introducing Geometric Shapes to Children**	2021	Lutfi Hikmatwati, Hayati M	GoGeo was found to be highly suitable for early childhood shape recognition. Expert validation and classroom trials confirmed improvements in understanding.	Teachers used the GoGeo app with interactive games involving visual and audio cues. Students also explored the app at home with parents as part of family learning.

6	**Enhancing Cognitive Ability in Recognizing Geometric Shapes Through Natural Material Media: Rainbow Stones**	2021	Winda Widyaningtyas, Destita Shari, Nanang Rokhman Saleh, Berda Asmara	Rainbow stone natural material media improved shape recognition among 3–4-year-olds. Improvements were observed across multiple cycles.	Researchers used colored natural stones and boards shaped into geometric forms. Children arranged stones based on shapes and colors to reinforce understanding.
7	**Enhancing Children's Cognitive Ability in Recognizing Geometric Areas and Numbers Through Geoboard Media**	2023	Yudi Wahyu Widiana, Gina Kania, Sri Sumarti	Cognitive abilities increased significantly through geoboard use—from 15.4% to 92.3% over two learning cycles.	The research used the Hopkins model (preliminary actions, planning, observation, reflection) to improve learning implementation across two cycles.

8	**Improving the Ability to Recognize Geometric Shapes Through Block Play Activities for Children Aged 4–5 Years**	2024	Mutiara Untari, Imam Mujtaba, Anita Damayanti	Children showed improved recognition of triangle, square, rectangle, and circle shapes through block play.	Teachers used block sets to support learning and play. Children built and identified shapes through guided exploration.
9	**Efforts to Improve Children's Cognitive Ability in Recognizing Geometry Through Board Media**	2021	Kholishotul Mu'awalin, Avanti Pramudyani, Jamilatus Saudah	Learning outcomes improved through interactive use of display boards, including hand-eye coordination, sorting patterns, and naming shapes.	Children attached their geometric work on boards as part of visual learning. The approach helped link shape recognition with physical activity.

10	**Improving Early Childhood Cognitive Ability Through Geometric Shape Recognition with Geoboard Media in Group B**	2021	Tri Haryati Solihah, Ronny Mugara, Ema Aprianti	Geoboard media stimulated cognitive growth and enhanced children's curiosity, motivation, and enjoyment in learning geometry.	Children were directly involved in making and identifying geometric shapes using geoboards, which fostered active engagement and conceptual understanding.

Discussion

1. Geometry and Early Childhood Learning

Introducing geometric shapes such as circles, triangles, squares, and rectangles to preschool-aged children is essential in building their early mathematical understanding. As emphasized by Mahmudah & Masykuroh (2023) and Novita et al (2019) and Chusna & Ningrum (2019), this foundational knowledge allows children to recognize and classify real-world objects, thus aiding their environmental awareness and cognitive development. This aligns with Ozcakir, Konca, & Arikan (2019), who note that geometric concepts should be introduced early, as they are part of daily life and a crucial component of children's educational progression.

The reviewed studies further reinforce these assertions. For example, the use of magic board media (Study 1) and block play (Study

8) allowed children to actively manipulate and construct shapes, helping them move beyond passive recognition into deeper conceptual understanding. Likewise, the integration of ethnomathematics (Study 2) connects geometric learning with local cultural contexts, making the experience more meaningful and contextual for children.

According to Indonesian government regulation (Permendikbud No. 137 Tahun 2014), children between 2–3 years should already begin recognizing basic shapes, and at age 4–5, they should engage with concrete mathematical concepts. These developmental expectations align with Piaget's theory of cognitive development, particularly the preoperational stage (ages 2–7), during which children begin to think symbolically and engage with visuals and representations.

2. Cognitive Development of Early Childhood

Cognitive development at this stage is closely tied to exploration, cause-effect understanding, and problem-solving (Permendikbud No. 137/2014). Jean Piaget's cognitive theory divides child development into four stages, with early childhood positioned in the preoperational phase. This stage is characterized by symbolic play and emerging logic, yet still grounded in tangible experiences.

The findings from the ten reviewed studies illustrate that appropriate media can stimulate cognitive development significantly. For instance, rainbow stone natural media (Study 6) and geoboard applications (Studies 7 and 10) provide children with concrete tools for constructing and understanding geometric forms. These studies

observed not only increased shape recognition but also cognitive improvements in problem-solving and abstract reasoning.

In particular, the geoboard-based studies demonstrated progressive gains across learning cycles—from as low as 15.4% to over 90% cognitive achievement—emphasizing the effectiveness of hands-on, repeated practice. Similarly, the use of visual display boards (Study 9) was shown to support hand-eye coordination, shape identification, and sequencing, reflecting higher-order cognitive processes consistent with Piaget's model.

3. The Role of Learning Media in Geometry Education

Learning media serve as crucial instructional tools that bridge abstract concepts and child-friendly experiences. As suggested by Aisyah Nurhikmah et al. (2023) and Azhar (in Irsan Mestika, 2018), effective media promote engagement, emotional connection, and deeper learning retention. The reviewed studies confirm this assertion through diverse examples:

- ICT-based media (Study 3) enhanced student motivation and improved learning outcomes by using interactive applications for geometry concepts like area and volume.
- GoGeo applications (Study 5) offered playful, multimedia content tailored to preschoolers, supported by home-based learning with parental involvement.
- Conventional media (e.g., LKS, posters) were found to be less engaging unless redesigned into interactive formats (Study 4),

underscoring the importance of innovation in media design.

These studies reveal that learning media are not merely supplementary but are fundamental to ensuring that geometry instruction is aligned with the developmental readiness of young children. When media are designed to be interactive, culturally relevant, and physically engaging, they activate multiple domains—cognitive, motoric, and social-emotional—which are critical in holistic early childhood education.

Conclusion

Based on the findings and discussion, it can be concluded that the use of appropriate and engaging learning media plays a crucial role in enhancing early childhood cognitive development, particularly in recognizing geometric shapes. The ten reviewed studies consistently demonstrate that various media—ranging from natural materials like rainbow stones, interactive technologies like geoboards and educational apps, to culturally contextual tools like ethnomathematics-based media—effectively support children's understanding of geometric concepts.

These learning tools do not only help children identify, name, and classify geometric shapes, but also promote broader cognitive skills such as logical thinking, spatial reasoning, hand-eye coordination, and problem-solving. Aligned with Jean Piaget's theory of cognitive development and national early childhood education standards (Permendikbud No. 137/2014), the findings emphasize that learning

should be concrete, exploratory, and enjoyable for children in the preoperational stage.

Therefore, early childhood educators are encouraged to integrate varied, interactive, and developmentally appropriate media in their teaching practices. By doing so, learning geometry becomes more meaningful and engaging, laying a strong foundation for children's mathematical thinking in future educational stages.

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