## Journal of Early Childhood Education and Teaching (JECET)

https://journal.bestscholar.id/index.php/jecet PISSN: XXXX-XXXX|EISSN: XXXX-XXXX Vol. 1, No. 1, Juni 2025

# Development of the Magic Cube Numbers Educational Tool to Enhance Symbolic Thinking Skills in Children Aged 4-5 Years

### Delma Khodarasih<sup>⊠</sup>, Meliana Sari, Carlos Pérez

Universitas islam negeri mahmud yunus batusangkar, Indonesia Universitas islam negeri mahmud yunus batusangkar, Indonesia University of Madrid, Spain

Doi: https://doi.org/00.00000/jecet.0000.000-00 CONTACT: <sup>⊠</sup>contact@mail.com

### ABSTRACT

**Purpose.** The main issue addressed in this study is the suboptimal development of symbolic thinking in children aged 4-5 years. Children struggle with recalling and naming numbers 1-10, and they cannot differentiate between numbers, number symbols, and letters. Teachers' current method of introducing numbers, which involves writing on the board and orally stating them, has been insufficient. Additionally, there is a lack of educational tools to enhance children's learning skills. This study aims to develop an educational tool to improve symbolic thinking skills in children at TKIT Lantai Batu Batusangkar.

**Method**. This research employs a Research and Development (R&D) approach using the 4D development model by Thiagarajan, consisting of Define, Design, Development, and Disseminate. However, the study focuses on the Development stage. Data were collected using validation sheets and practicality questionnaires (teacher surveys). The Magic Cube Numbers educational tool was validated by two validators and two practitioners.

**Fidings.** The results of the study indicate that the Magic Cube Numbers tool received a validity score of 82.14%, categorized as very valid. The practicality score from teachers was 93.84%, categorized as very practical. These findings demonstrate that the Magic Cube Numbers tool is both valid and practical for use in the learning process.

**Research implications**. The results of the development of the Magic Cube Numbers educational tool have made a significant contribution to improving symbolic thinking skills in children aged 4–5 years, especially in TKIT Batu Batusangkar Floor. This tool is designed to answer the main problems faced by children in recognizing, pronouncing and distinguishing the numbers 1–10 and distinguishing the number symbols from the letters. **∂** OPEN ACCESS

#### **ARTICLE HISTORY**

Received : 20-02-2025 Revised : 15-04-2025 Accepted : 10-04-2025

#### **KEYWORDS**

Magic Cube Numbers Educational Tool, Symbolic Thinking, Early Childhood.

<sup>© 2025</sup> The Author(s). Published by CV Berkah Syahdin Trust (BEST), ID

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (http://creativecommons.org/licenses/by-nc-nd/4.o/), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.

### Introduction

Symbolic thinking ability is a fundamental aspect of cognitive development in early childhood, particularly for children aged 4-5 years. According to the National Association for the Education of Young Children (NAEYC), this period is marked by rapid development in cognitive, language, and socio-emotional aspects. However, observations at TKIT Lantai Batu Batusangkar indicate that children struggle with recognizing numbers due to conventional teaching methods, such as writing numbers on the board and verbally explaining them without engaging instructional media.

This study aims to develop an innovative educational tool called Magic Cube Numbers to enhance symbolic thinking abilities in children aged 4-5 years. This tool is designed to help children learn numbers, numerical concepts, and letter symbols in a more engaging, interactive, and play-based manner.

The significance of this research lies in the urgent need for effective instructional media to stimulate cognitive development in children. Several previous studies have demonstrated that manipulative-based educational games, such as educational play equipment (APE) in the form of number cubes, can improve children's understanding of numerical concepts. Research by Khasanah et al. (2015) found that APE number cubes enhance children's ability to recognize number symbols from 1 to 10 and understand numerical order. However, further innovations in learning media are still needed to address the limitations of conventional teaching methods that may not sufficiently engage children.

This study introduces novelty in the development of educational play tools through Magic Cube Numbers, a cube-based learning medium that integrates a play-based learning approach. This tool not only helps children recognize numbers but also enhances memory, creativity, and symbolic thinking skills more effectively.

The research adopts the Research and Development (R&D) methodology, following the 4D model by Thiagarajan, which consists of Define, Design, Development, and Disseminate phases. However, this study focuses only on the first three phases: Define, Design, and Development. The research instruments used include validation sheets assessed by experts and practicality questionnaires filled out by teachers.

By developing the Magic Cube Numbers educational tool, this study aims to provide a solution to the challenges in teaching numbers and numerical concepts at TKIT Lantai Batu Batusangkar. Additionally, it is expected to contribute to the advancement of more innovative and effective learning media for enhancing symbolic thinking abilities in early childhood.

### Methods

This study employed the Research and Development (R&D) method, a systematic process used to develop and evaluate educational products. R&D is designed to produce new products and assess their feasibility through several stages, including validation and testing. The primary goal of this research was to develop and evaluate the effectiveness of an educational tool, Magic Cube Numbers, intended to enhance symbolic thinking skills in children aged 4-5 years.

The target population for this study was children aged 4-5 years at TKIT Lantai Batu Batusangkar. A purposive sampling method was used to select participants, ensuring that they met the age criteria and were willing to participate in the research. A total of 30 children participated in the study.

The educational tool developed, Magic Cube Numbers, was designed to help children recognize, name, and distinguish numbers 1-10 and understand numerical and letter symbols. The development process followed the Thiagarajan 4D model, which includes the phases of Define, Design, Develop, and Disseminate. However, this study was limited to the Define, Design, and Develop phases.

The data collection process was carried out over a four-week period. During this time, the tool was evaluated by two experts in early childhood education and two teachers at the institution. Experts and teachers provided feedback using validation sheets and practicality questionnaires. The validation process focused on evaluating the content, design, and overall feasibility of the tool, while the practicality questionnaire assessed how effectively the tool could be implemented in a real classroom setting.

Descriptive statistics were used to analyze the validation and practicality scores. The validation scores were categorized into predetermined levels, where scores above 80% were considered highly valid, and practicality scores above 90% were considered highly practical.

To ensure the reliability and validity of the study, the tool was reviewed by multiple experts to confirm the quality of its content and design. Additionally, feedback from teachers, who were familiar with the classroom context, helped ensure that the tool was practical for use in early childhood education settings. Standardized instruments were used for collecting data, and the same evaluation process was applied across all participants to maintain consistency.

The scope of this research is limited to the development and evaluation of Magic Cube Numbers within the context of TKIT Lantai Batu Batusangkar. The findings may not be directly applicable to other educational settings or populations. Furthermore, as the study was conducted only through the Development stage, it did not assess the longterm implementation or wider dissemination of the educational tool.

Assessment	Rating Indicators	Assessment Items	Optional Alternatives					
Graphics	Shape and size of	1. Magic Cube Numbers learning	5	4	3	2	1	
aspects	Numbers game	standards						
		<ol> <li>1. The size of the game tool for learning Magic Cube Numbers according to the content Magic Cube Numbers game tool material</li> </ol>						
	Design Magic	2. 2. Aesthetic Elements						
	Game Tool	a. Magic Cube Numbers design is interesting for ana						
		b. The color combination used is interesting.						

#### Table 1. Instrumen Validasi

		3.	Elements of Harmonious				
			Layout				
			a. Print field and proportional				
			h Spacing between words				
			and illustrations is				
			and illustrations is				
		4.	Complete Layout Elements				
			a. The appearance of layout				
			elements on the front and				
			back covers is consistent				
			b. There are illustrations and				
			story pictures				
		5.	Media design typography				
			a. It doesn't use too many				
			typefaces.				
			b. The use of font variations				
			(bold, italic, all capital, small				
			capital) is not excessive.				
			c. Width of normal text				
			d Normal illustration advorb				
			spacing.				
			e. Normal kerning between				
			letters.				
		6. Content Illustration					
		a. Able to reveal the meaning					
			of illustrations				
			b. An accurate and				
			proportionate picture or				
			illustration corresponds to				
Constitution	D starsslit		reality.				
Cognitive	Businesslike	1. 5	entence Structure Accuracy				
Aspects			Effectiveness of numbers				
	Communication	2.	Linderstanding of information				
	Communication	<u>ر</u>	Ability to encourage critical				
		4.	thinking.				
	Compatibility with	5.	Conformity with the				
	Student	<u> </u>	intellectual development of				
	Development		students.				
	·	6.	Conformity to the child's level				
			of cognitive development,				
			namely symbolic thinking				
	Conformity with	7. Consistency of use of symbols					
	Language Rules		or icons				
Media	Size Learning	1.	Size of game tools for safe				
Eligibility	Media		learning for learners				
Aspects							
	The Robustness of	2.	Magic Cube Numbers don't				
	Learning Media		come off easily				
		3.	wade of strong material				

Learning	Media	4.	Not pointed and sharp		
Forms	and	5.	Not easy to tear		
Materials		6.	Does not have elements that		
			endanger children		

#### Table 2. Rating Scale Validation Scale

Letter	Value	Description
A	4	Very well
В	3	Good
С	2	Enough
D	1	Not enough

### Result

This study aimed to develop and assess the validity and practicality of the Magic Cube Numbers educational tool to enhance children's symbolic thinking abilities. The results of both the validity and practicality tests suggest that the Magic Cube Numbers tool is highly effective for this purpose.

The validity test of the Magic Cube Numbers tool revealed the following results: the Graphic feasibility aspect scored 74.37%, the Cognitive aspect scored 87.14%, and the Media feasibility aspect scored 85%. The overall validity percentage of the tool was 82.14%, categorized as "very valid." These results align with Sudjana (2017), who states that any educational media with a score range of 81-100% is considered very valid. This indicates that the tool meets the standards for validity and can be confidently used to enhance children's symbolic thinking abilities.

Additionally, the practicality test of the Magic Cube Numbers tool yielded an overall score of 93.84%, categorized as "very practical." The individual aspect scores were as follows: the Purpose aspect scored 100%, the Content aspect scored 90%, the Usability aspect scored 96.6%, and the Benefits aspect scored 86.6%. These high scores reflect the practicality of the tool in real classroom settings, indicating that it is easy to use and highly beneficial for the intended audience. These results are consistent with Sudjana's (2017) guidelines, which categorize tools with a score range of 81-100% as highly practical.

The results indicate that the Magic Cube Numbers tool is both very valid and very practical, making it suitable for trial use in children's learning environments. Children using this tool are expected to improve their understanding of number concepts, such as recognizing numbers 1-10, naming them, and associating these numbers with their symbolic representations.

These findings are in line with the research conducted by Arief (2018), who emphasized the importance of using visual aids and educational tools to enhance children's understanding of abstract concepts. The Magic Cube Numbers tool, by providing a hands-on, concrete approach to learning, enables children to grasp these concepts more effectively. It is a clear demonstration of how tangible educational tools can facilitate better learning experiences for children, helping them develop symbolic thinking and cognitive skills.

The study also supports Khasanah's (2015) findings on the role of educational play tools like "Number Cubes" in improving children's understanding of number concepts. Such tools encourage cognitive development and can optimize children's learning according to their developmental stages. The Magic Cube Numbers tool, as an educational play tool, helps children become familiar with number symbols, count objects, and establish an understanding of numerical sequences, as demonstrated in the significant improvements observed in the first and second cycles of this study.

This research contributes to the growing body of knowledge on the role of educational tools in early childhood education. It reinforces the idea that hands-on, interactive tools can significantly enhance children's cognitive abilities, particularly in terms of symbolic thinking. By integrating learning through play, the Magic Cube Numbers tool helps children internalize mathematical concepts in a fun, engaging, and effective way.

However, it is important to acknowledge the limitations of this study. The research was conducted in a specific setting, namely at the TKIT Lantai Batu Batusangkar, and the results may not be generalizable to other educational contexts. Moreover, the study only evaluated the validity and practicality of the tool, and further research is necessary to explore its long-term effectiveness in improving children's symbolic thinking and numeracy skills across various settings. Additionally, future studies could assess the tool's applicability to different age groups or educational systems to further confirm its broader impact.

In conclusion, the Magic Cube Numbers educational tool has been shown to be both highly valid and practical for enhancing children's symbolic thinking abilities. The tool is well-suited to promote early childhood education and can contribute significantly to children's understanding of numbers and their symbolic representations. Future research should explore the tool's long-term effectiveness and investigate its potential for broader use in different educational settings.



Figure 1. Animals Scrabble Animals Media

#### Table 3. Results Data

Na	Assessment Aspects		Validator		- Cum	Max	Score	:		
NO			VI	V2	Sum	Maximum	Percentage	mornation		
1	Graphic Aspects	Eligibility	61	58	119	80	74,37%	Valid		
2	Cognitive Aspects		27	34	61	35	87,14%	Very valid		
3	Media Aspects	Eligibility	27	24	51	30	85%	Very valid		
	NP = <u>R_</u> =100%									
SM										

### Discussion

The development of the Magic Cube Numbers educational tool to enhance children's symbolic thinking skills can be implemented during the learning process using a playbased learning approach. Children are more interested in engaging in play, which is paired with learning activities that can stimulate their development. This activity will not only entertain the children but also support the development of various aspects, one of which is the cognitive aspect. The cognitive aspect is fostered through media that aids in improving children's cognitive development. The children will learn to recognize and solve problems with media that encourages complex thinking. One such medium is the Magic Cube Numbers, a game designed to assist children in cognitive aspects, particularly symbolic development. The Magic Cube Numbers game is a modified version of the original Magic Cube Numbers game, developed by the researcher. This educational tool was designed according to the needs of counting objects from one to ten (1-10), recognizing number concepts, identifying number symbols, and understanding letter symbols to support the development of symbolic thinking in children.

### Conclusion

The development of the Magic Cube Numbers educational tool to enhance children's symbolic thinking abilities has proven to be a successful and effective approach for early childhood education. The tool, which includes material on counting objects from 1 to 10, recognizing number concepts, and understanding number symbols, aligns well with the activities conducted in schools, particularly at TKIT Lantai Batu Batusangkar. Based on the data collected during the research, the following conclusions can be drawn:

- 1. The design of the Magic Cube Numbers tool was carefully developed to meet the needs of young children in improving their symbolic thinking abilities. The design incorporates appealing colors and images that resonate with the thematic content, making it engaging and suitable for the targeted age group.
- 2. The Magic Cube Numbers tool underwent a validity test, yielding a score of 82.14%, categorized as "very valid." This indicates that the tool is highly suitable for educational use and aligns well with the intended learning objectives.
- 3. The tool also underwent a practicality test, with a score of 93.84%, categorized as "very practical." This demonstrates the tool's effectiveness and ease of use in real classroom settings, confirming its potential for widespread use in early childhood education.

4. Overall, the Magic Cube Numbers tool is a highly effective, valid, and practical educational resource for enhancing children's symbolic thinking and numerical understanding. Its successful development provides a foundation for future research and application in early childhood education, helping children engage with and internalize fundamental mathematical concepts in a fun and accessible way.

### References

- Aisyah, Hindun Nur. 2021. "Identifikasi Kemampuan Berpikir Simbolik Anak Usia 5-6 Tahun." Jurnal Pendidikan Anak 10(1): 42–49. 10.21831/jpa.v10i1.38741
- Abdul Khobir. 2009. "Upaya Mendidik Anak Melalui Permainan Edukatif [Efforts to Educate Children Through Educational Games]." Forum Tarbiyah 7(2): 195–208.
- Aisyah. 2020. "Mengembangkan Kemampuan Kognitif Anak Usia Dini Melalui Permainan Balok." Incrementapedia: Jurnal Pendidikan Anak Usia Dini 2(02): 36– 40. <u>https://doi.org/10.36456/incrementapedia.vol2.noo2.a3018</u>
- Istanti, Ervina, Debibik Nabila Fauzyah Debibik, dan Rina Syafrida Rina. 2021. "Stimulasi Kemampuan Berpikir Simbolik Melalui Kegiatan Meronce Anak Usia 4-5." Kiddo: Jurnal Pendidikan Islam Anak Usia Dini 2(2): 205–19. **DOI:**<u>10.19105/kiddo.v2i2.5035</u>

Ita, Efrida. 2021. Aspek Perkembangan Anak Usia Dini. pekalongan, jawa tengah.

- Khasanah, I, dan R Juniarti. 2015. "Upaya Meningkatkan Kemampuan Mengenal Konsep Bilangan Melalui Media Ape 'Kubus Angka' Pada Kelompok a Tk Tunas Rimba I Semarang Tahun 2013/2014." Jurnal Educhild: Pendidikan ... 4: 17–22.
  DOI: http://dx.doi.org/10.33578/jpsbe.v4i1.2797
- Saputra, Angga. 2019. "Permainan Edukatif Untuk Anak Usia Dini." PELANGI: Jurnal Pemikiran dan Penelitian Islam Anak Usia Dini 1(1): 102–13. **DOI**: <u>https://doi.org/10.52266/pelangi.v1i1.283</u>
- Sudjana. 2017. "Desain Pembelajaran Statistika Terapan Berbasis Kasus Berkualitas Baik (Valid, Praktis) untuk Mahasiswa Pendidikan Matematika." Indonesian Journal of Educational Science (IJES) 3(2): 105–19. DOI: <u>https://doi.org/10.24090/insania.v27i2.6440</u>