



Development of Jump Number Play Media in Stimulating Children's Cognitive Development

Alqolida Munasti*, Shofiyanti Nur Zuama, Hamzia Marie, Durrotunnisa

Early Childhood Education Teacher Education Program, Tadulako University, Palu City, 94119, Indonesia

ARTICLE INFO

Article history:

Received: 26 Nov 2025

Revised: 25 Feb 2026

Accepted: 27 Feb 2026

Published online: 05 March 2026

Keywords:

Jump Number Play,
Cognitive,
Early Childhood

* Corresponding author:

E-mail: alqolidamunasti@gmail.com

Article Doi:

<https://doi.org/10.31258/jes.10.3.p.96-106>

This is an open access article under the [CC BY-
SA](https://creativecommons.org/licenses/by-nc-sa/4.0/) license.



ABSTRACT

The problem in this study lies in the cognitive ability of children in recognizing the symbols of numbers 1-20, which has not developed as expected. This study aims to determine the development of Jump Number Play (JNP) media in stimulating children's cognition. This study used Research and Development (R&D) with the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) development model. The research subjects consisted of 16 children, comprising 7 girls and 9 boys in the odd semester of the 2025/2026 academic year. Data were collected through observation and interviews with homeroom teachers. The final stage of expert validation of the JNP media obtained 100% and media experts obtained 97.05%. These results show that the JNP media is very valid in stimulating children's cognitive development in recognizing the symbols for numbers 1-20. The results of observations and children's responses after playing with the JNP media, in terms of recognizing the symbols for numbers 1-20, showed that there were 2 children (12.50%) in the BSB category, 12 children (75.00%) in the BSH category, 2 children (12.50%) in the MB category, and no children in the BB category. In terms of naming number symbols 1-20, there were 2 children (12.50%) in the BSB category, 12 children.

1. Introduction

The Father of Indonesian National Education, Ki Hajar Dewantara, defined the meaning of education as follows: "Education is a requirement in the growth of children, and its purpose is to guide all the natural powers inherent in children, so that they become human beings and as community members can achieve safety and happiness to the highest degree." Education is a humanistic process, also known as humanizing humans. Therefore, we should respect the human rights of every human being. Students are not machines that can be controlled at will, but rather a generation that we need to help and care for in every stage of their development towards maturity so that they can become independent, think critically, and possess

good moral character. To that end, education does not only shape individuals who are different from others who can eat, drink, dress, and have a house to live in. This is what is referred to as humanizing humans (Ujud et al., 2023).

The definition of early childhood education as included in the 2003 National Education System Law, Article 1, paragraph 14, states that: Early childhood education is an effort aimed at children from birth to six years of age, carried out through the provision of educational stimuli to assist physical and mental growth and development so that children are prepared to enter further education. Another definition of early childhood based on developmental psychology is between the ages of 0 and 8 years (Adawiah & Ubaidilah, 2023). Early childhood education is expected to foster children's love for the areas of development introduced to them. One area of development that is considered very important for early childhood is cognitive development. Cognitively, children begin to develop and understand school through their relationships with the world around them. Children can speak almost perfectly, not only expressing their desires and needs, but also conveying their ideas and experiences. As with every aspect of development, which will be discussed here, it must be remembered that all aspects of a child's development are interrelated. Although physical, cognitive, and social development can be separated, the reality is that they are not only interrelated, but also influenced by the environment in which they grow and develop (Zega & Suprihati, 2021).

According to Ayuni (Mayar et al., 2022) Early childhood is a period of rapid growth and development. Experts consider this age to be a golden age, which only occurs once in the course of human life. Young children are the future generation of the country, so they must be nurtured, developed, and guided from an early age in order to find the path to a bright future (Isabella, 2021). According to Desmita (Afifah et al., 2023) Cognitive development must also be developed in the same way as other developmental abilities. Cognitive development also progresses step by step toward perfection or maturity. Simply put, cognition is understood as a child's ability to think more complexly and their ability to reason and solve problems. Developed cognitive abilities will make it easier for children to master other general knowledge so that they can function in a wide range of social interactions. Their cognitive development progresses rapidly, as children begin to understand basic concepts such as colors, numbers, shapes, and letters. They also begin to develop thinking skills, problem-solving abilities, and creativity in the way they think and solve problems.

Sujiono in Mulyani, et al. (2019) Analyzing the theory of cognitive definition can be interpreted as meaning that every individual can think, connect, assess, and consider every incident or event that the individual experiences. According to Piaget in Susanto (2014) that children in this age range are in the stage of concrete preoperational thinking. The nature of this period egocentricity in children is becoming more apparent. Children have a different perspective from other people around them. One of the abilities or aspects at the cognitive level that must be developed and is important to stimulate from an early age is the ability to recognize number symbols, name number symbols, and sequence number symbols. The introduction of number symbols needs to be given from an early age, taking into

account the stages of child development in an appropriate manner (Umi, 2018). Children generally have a high ability to understand numbers in everyday life. Introduction to number symbols is very important for the cognitive development of early childhood. Interest in numbers is generally very high in early childhood. Therefore, an appropriate approach and individual support are needed to meet the unique developmental needs of each child. It is very important at this stage to explore early childhood development by providing stimuli that can develop their potential to the maximum (Handayani et al., 2023).

Statement from Susanto (2011) that kindergarten children's ability to recognize numbers is that they are able to count, recite the numbers 1-20 in order, count (recognize the concept of numbers with objects) up to 20, arrange the numbers 1-20 in order with objects, connect number symbols or match number symbols with objects up to 20 (children are not asked to write), and distinguish and make two sets of objects that are equal in number, unequal in number, more, and less. In accordance with the early childhood education curriculum, one of the competencies that young children should develop is the ability to recognize numbers. For young children, this ability is referred to as the ability to recognize numbers at an early stage, which is the ability that every child has to develop their abilities. The characteristics of their development begin in the environment closest to them, and as their abilities develop, children can progress to the stage of understanding numbers, which is related to addition and subtraction (Masturoh et al., 2024).

Based on preliminary surveys and observations at Kartika XXI-19 Kindergarten in East Palu District, the author found several problems related to children's cognitive development in recognizing, naming, and sequencing number symbols, which had not developed as expected. This was evident from the monotonous learning process, which caused children to lose interest in learning number symbols. One of the reasons children have difficulty recognizing these number symbols is because the activity of introducing numbers 1-20 is done by the teacher writing the numbers on the board and saying them aloud. Children are asked to say and write the numbers in their notebooks. In addition to writing according to the examples given by the teacher, number recognition activities are also carried out by connecting dotted lines that form a number pattern using the Children's Worksheet (LKA). After completing the task, the teacher asks the children to say the numbers they have written.

In addition to these issues, the use of learning media has not been maximized, and the use of play-based methods has not been optimized, affecting children's interest in participating in the learning process, causing them to become bored with learning. Young children are also active, always wanting to move and play (Yuliandra et al., 2023). Playing is essentially more about playing than learning for young children; playing is something that leaves a lasting impression for children (Lily et al., 2023). The world of children is a playground; every activity should be organized with a playful approach, because for young children, learning happens when they play, and conversely, they learn while playing (Hamdata et al., 2025). Given this analysis of the problem, children's ability to recognize numerical symbols needs to be developed in an appropriate manner, namely by continuing to

adhere to the principle of learning through play or playing while learning, because early childhood education essentially emphasizes learning through play, which means that every learning activity must be enjoyable. As educators, efforts to develop children's potential must be in accordance with their stage of development, learning principles, and characteristics of early childhood. During this process, the aim should be to provide basic concepts that leave an impression on children through real experiences. These real experiences will enable them to demonstrate activity and a great sense of curiosity.

Based on findings in the field, there is a need for a more structured approach that focuses on children's cognitive development. The need to stimulate children's cognitive development is very important and should be pursued through various forms of activities that are interesting and enjoyable for children. However, the conditions found by the author are more challenging, because limitations in learning media often become obstacles and challenges in providing play activities that hone children's cognitive abilities, especially introducing, naming, and sequencing number symbols or numbers. Given the challenges in children's cognitive abilities that have not developed as expected, one effective approach to stimulating children's cognition chosen by the author is the number jumping game or jump number play. This game is adapted from the traditional game of hopscotch. The game developed by the author is called jump number play. The methods and rules of the game remain the same, but the author has made it out of flannel so that it can be folded back with numbers that attract children's interest. The author will try their best to develop a simple and interesting jump number play medium that is effective and can be applied flexibly according to the conditions and needs of the children at Kartika XXI-19 Kindergarten in East Palu District.

2. Methodology

This type of research uses a developmental research design or *Research and Development* (R&D). According to Sugiyono (2013) that "research methods *Research and Development* (R&D) is a research method used to produce certain products and test their effectiveness. To produce certain products, needs analysis research is used, and to test the effectiveness of these products so that they can function according to the needs of the school, research is needed to test the effectiveness of these products so that the final result of this research will produce a media jump number play product development to improve children's cognitive abilities. Research method R&D according to Sukmadinata (2008), Research and development (R&D) is a research approach to produce new products or improve existing products. Research and development is different from ordinary research which only produces suggestions for improvement, research and development produces products that can be used immediately. Meanwhile, Rohaeni (2020) explains that "The ADDIE model provides a way to navigate the complexities associated with developing models for use in intentional learning environments."

In addition, according to Rohaeni (2020) that "The ADDIE model is considered to be more rational and comprehensive than other models. Therefore, this model can

be used for various types of product development, such as models, learning strategies, learning methods, media, and teaching materials.” The development procedure to be carried out consists of five stages according to Sidabutar et al. (dalam Selvia Mariati, 2024). Figure 1 is a diagram of the ADDIE model.

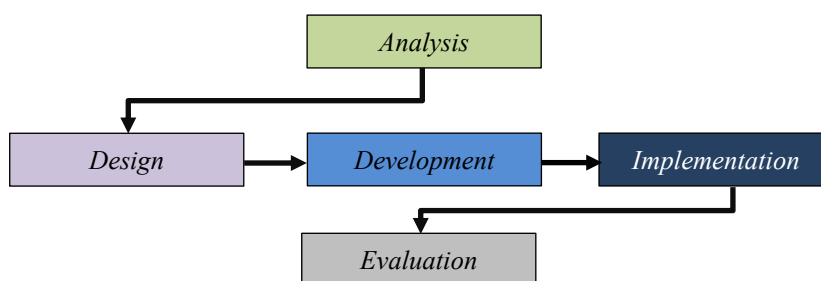


Figure 1. ADDIE stages

In accordance with the ADDIE model, the author will explain the stages of the development research plan to be implemented, as follows:

1. *Analysis*. This analysis stage collects information about learning needs in the classroom, related to children's cognitive needs. The learning objective is to improve children through the provision of jump number play media, and the characteristics of the students are children in group B of Kartika XXI-19 Kindergarten. The results of this analysis help the author understand the learning needed in the classroom and the challenges faced by children so that they can enjoy the learning process and make it more interesting and entertaining.
2. *Design*. After the information is collected, the next step is for researchers to design the product to be made, such as determining the types of materials that will be assembled to form the jump number play media. This stage consists of frameworks before product development. In addition, clarification is needed. learning products designed so that they can achieve the expected learning objectives, related to stimulating children's cognitive development.
3. *Development*. The development stages include:
 - a. *Product manufacturing*. This stage involves printing the product based on the design created in the design stage. All components that have been designed and prepared are assembled into a single component of the jump number play media product.
 - b. *Validation*. Validation design and media usage testing in this study were conducted through an assessment stage carried out by one media expert (lecturer) and one subject matter expert or academic expert (lecturer). The results of this stage were critiques, suggestions, and comments that could be used as a basis for conducting the first stage of revision of the developed media. The product will be revised based on the comments and suggestions from the validators. After making initial revisions, the product is resubmitted to media experts, subject matter experts, and practitioners for final validation. Once it has been declared suitable for testing, the next step is to test the jump number play media with users (in this case, the early childhood education children being studied).

According to Akbar (Chairunnisa, 2024) The results of data analysis were used to determine the accuracy, effectiveness, and attractiveness of the jump number play media development. The author used a Likert scale, which was modified by Sugiono with the following four scales (Table 1).

Table 1. Guidelines For Scoring the Validation of Guidelines

Description	Score
Very good	4
Good	3
Fair	2
Poor	1

Analysis of materials obtained from material experts and media experts. Validity data will be analyzed with percentage descriptions using the following formula Akbar (2015):

$$V = \frac{TSEV}{S - max} = 100\%$$

Description:

V = Validasi

TSEV = Total score validator empiris

S-max = Expected maximum score

100% = Kostanta

Next, interpretation and decision-making regarding the quality of the development product are provided using the following validation criteria in Table 2.

Table 2. Validation Criteria Guidelines

Criteria	Validation Level
75.01% - 100.00%	Very valid, can be used without revision
50.01% - 75.00%	Sufficiently Valid (can be used with minor revisions)
25.01% - 50.00%	Not valid (Not can used)
00.00% - 00.25%	Not valid

4. *Implementation*. This stage involves testing the jump number play media product on early childhood students in Group B at Kartika XXI-19 Kindergarten. This stage can be used to consider whether or not to revise the product to make it even better. The implementation step is often linked to the implementation of the learning program itself.

5. *Evaluation*. The evaluation stage is carried out by reviewing the impact of learning with the developed product and the achievement of product development objectives. This stage is carried out to determine the improvements that need to be made to the developed learning media. The evaluation stage also aims to analyze the validity and practicality of the media and stimulate children's

cognition after using the jump number play media developed in the implementation stage.

In addition, the author chose to use the ADDIE development method because this development model has advantages in terms of its systematic process stages. Each stage is evaluated and revised from the stages that have been passed so that the resulting product is a valid product. In addition, the ADDIE model is very simple but its implementation is systematic. Therefore, this research and development aims to produce a product that is accountable in this research process. The author will develop a product that is created and developed, and will test the effectiveness of the product. The author plans to choose a research and development model with the ADDIE concept with product development in the form of Jump Number Play media to stimulate children's cognition.

3. Results and Discussion

The results of the research conducted by researchers from October to the end of November 2025 in group B of Kartika XXI-19 Kindergarten were part of the process of obtaining data related to the aims and objectives of the research. Two types of data were obtained during the research: first, data on the product feasibility test results from media and material experts; second, data on the field test results for children in Group B at Kartika XXI-19 Kindergarten. This research was conducted to observe the improvement in cognitive abilities in recognizing, naming, and sequencing the symbols for numbers 1-20 in children after the experiment using the Jump Number Play media.

This study resulted in the development of a jump number play medium designed to stimulate children's cognitive abilities in recognizing the symbols for numbers 1-20. This medium was developed to attract children's interest so that they can play while learning, especially in recognizing the symbols for numbers 1-20. The cognitive aspects that need to be developed are as follows:

Table 3. Observation Aspects

Indicators
1. Aspect of recognizing number symbols 1-20
2. Aspect of naming number symbols 1-20
3. Aspect of ordering number symbols 1-20

As shown in the table, the results of the recapitulation of observations on the cognitive abilities of children before being given treatment in recognizing number symbols from 16 children who were the subjects of the study in three aspects, namely the aspect of being able to recognize number symbols, the aspect of being able to mention number symbols, and the aspect of being able to sequence number symbols, had the same number in each aspect, namely (12.5%) in the BB category, (87.5) in the MB category, (0%) in the BSH category, and (0%) in the BSB category.

Table 4. Observation Results Before Treatment

Category	Aspects of Media Development in Jump Number Play						Average (%)
	Aspects of Recognizing Number Symbols		The Ability to Count Numbers		Aspects Capable of Sorting Numerical Symbols		
	F	%	F	%	F	%	
Developing Very Well (BSB)	0	0.00	0	0.00	0	0.00	0
Developing As Expected (BSH)	0	0.00	0	0.00	0	0.00	0
Starting To Develop (MB)	14	87.50	14	87.50	14	87.50	87.5
Not Yet Developed (BB)	2	12.50	2	12.50	2	12.50	12.5
Total	16	100	16	100	16	100	100

Table 5. Observation Results After Treatment

Category	Aspects of Media Development in Jump Number Play						Average (%)
	Aspects of recognizing number symbols		The ability to count numbers		Aspects capable of sorting numerical symbols		
	F	%	F	%	F	%	
Developing Very Well (BSB)	2	12.50	2	12.50	2	31.25	18.75
Developing As Expected (BSH)	12	75.00	12	75.00	9	56.25	68.75
Starting To Develop (MB)	2	12.50	2	12.50	2	12.50	12.5
Not Yet Developed (BB)	0	0.00	0	0.00	0	0.00	0
Total	16	100	16	100	13	100	100

As shown in the table, the results of the recapitulation of observations on the cognitive abilities of children after being given treatment in recognizing number symbols from 16 children who were the subjects of the study in three aspects, namely the aspect of being able to recognize number symbols, the aspect of being able to mention number symbols, and the aspect of being able to sequence number symbols, had different numbers, namely in the aspect of recognizing number symbols (0%) in the BB category, (12.5%) in the MB category, (68.75%) in the BSH category, and (18.75%) in the BSB category.

Table 6. T-test

	Paired Differences	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Significance	
				Lower	Upper			One-Sided p	Two-Sided p
Paired Sample 1	Pretest - Posttest	3.7500	1.18322	-4.38049	-3.11951	12.677	15	<.001	<.001

Thus, it can be concluded that the jump number play media developed can stimulate cognitive development in early childhood. This can be seen from the t-test results on the post-test of cognitive abilities, which show a significant value below (<0.05). Thus, H_0 is rejected and H_a is accepted. The jump number play media was created in stages, then tested and validated by several validators. There were two validators involved, namely media validators, who were lecturers, and material validators, who were also lecturers. This was done to assess whether the developed product met the criteria and was suitable for testing. The following are the calculations from the two validators:

$$V = \frac{TSEV}{S-max} \times 100\%$$

Media expert validation

$$V = \frac{66}{68} \times 100\%$$
$$V = 97.05 \%$$

Subject matter expert validation

$$V = \frac{52}{52} \times 100\%$$
$$V = 100 \%$$

The media validator results obtained a score of 66 with a percentage of 97% (Highly valid) and the material validator results obtained a score of 52 with a percentage of 100% (Highly valid). Based on Figure 2 below, the introduction of numbers 1-20 to children using the jump number play method at Kartika XXI-19 Kindergarten in East Palu District. It can be concluded that the introduction of numbers to early childhood must be interesting and appropriate to the child's stage of development. A fun learning process can increase children's interest and participation during the activity.



Figure 2. Children playing the jump number game

4. Conclusion

From the research data and discussion on the development of jump number play media, it can be concluded that the development of jump number play media uses the ADDIE development research method through the stages of analysis, design, development, implementation, and evaluation. The jump number play media that was developed was declared feasible through validation by several experts, namely media experts and material experts. The jump number play media developed has been proven effective in stimulating cognitive development in early childhood in recognizing numbers 1-20. This can be seen from field tests that obtained significant results.

References

- Adawiah, R., & Ubaidilah, T. (2023). *Pengembangan Pendidikan Holistik Berbasis Karakter Pada Pendidikan Anak Usia Dini Di Desa Kaduagung Tengah Kecamatan Cibadak Kabupaten Lebak*. 4(1), 14–32.
- Afifah, S. N., Rosowati, A., Laila, R., Nadziroh, F. N., & Amanatin, H. (2023). *Pengaruh Pengenalan Huruf Abjad Melalui Kartu Huruf Terhadap Kemampuan Kognitif Anak Usia 4-5 Tahun di Tk*. 3(2).
- Chairunnisa, I. (2024). Kelayakan Uji Validitas dan Praktikalitas Media Pembelajaran Interaktif Berbantuan Construct 2 pada Pembelajaran IPAS Menggunakan Model Problem Based Learning di Kelas IV Sekolah Dasar. *Jurnal cendekia pendidikan dasar*, 2, 4. <https://doi.org/https://doi.org/10.24036>
- Hamdata, F. A., Sutisna, I., & Juniarti, Y. (2025). *Pengaruh Aplikasi 123 Numbers Terhadap Pemahaman Konsep Bilangan 1 – 20 pada Anak 5-6 Tahun*. 325–343.
- Handayani, S., Juita, A. K., & Indonesia, U. B. (2023). *Implementasi Pembelajaran Pengembangan Kognitif AUD dengan Mengenal Angka 1-20 pada Anak Kelompok B*. 3(1), 43–52. <https://doi.org/10.37680/absorbent>
- Isabella, hasiana. (2021). *Pengaruh Permainan Tradisional Dakon Terhadap Kemampuan Berhitung Angka 1-20 Pada Anak Kelompok B*. 4(2).
- Lily, N. M., Khotimah, N., & Maarang, M. (2023). *Efektivitas Permainan Tradisional Congklak Kemampuan Berhitung Anak Usia Dini*. 4(1), 296–308. <https://doi.org/10.37985/murhum.v4i1.214>
- Masturoh, Siti, K., & Mahsiani, M. L. (2024). *Analisis Kemampuan Mengenal Bilangan 1-20 Menggunakan Kantong Stik Es Krim Anak Kelas A di PAUD Raudatul Jannah Usia 4-5 Tahun*. 5(4), 40–51.
- Mayar, F., Uzlah, U., & Ermiwati, S. (2022). *Pengaruh Lingkungan Sekitar Untuk Pengembangan Kreativitas Anak Usia Dini*. 6(5), 4794–4802. <https://doi.org/10.31004/obsesi.v6i5.2665>
- Mulyani, S., Mansoer, Z., & Hardiyanto, L. (2019). *Upaya Meningkatkan Kemampuan Kognitif melalui Media Tabung Pintar*. 1–8.
- Rohaeni, S. (2020). pengembangan sistem pembelajaran dalam implementasi kurikulum 2013 menggunakan model ADDIE pada anak usia dini. *Instruksional*, 1(2), 122-130.
-

- Sugiyono. (2013). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. PT Alfabeta.
- Susanto, A. (2014). *Perkembangan Anak Usia Dini*. Kencana Premedia Group.
- Umi, R. (2018). Pengembangan Media Pembelajaran Puzzle Melalui Kartu Angka. *Al-Athfaal: Jurnal Ilmiah Pendidikan Anak Usia Dini*, 1(1), 1–17. <https://doi.org/10.24042/ajipaud.v1i1.2998>
- Ujud, S., Nur, T. D., Yusuf, Y., Saibi, N., & Ramli, M. R. (2023). Penerapan Model Pembelajaran Discovery Learning Untuk Meningkatkan Hasil Belajar Siswa Sma Negeri 10 Kota Ternate Kelas X Pada Materi Pencemaran Lingkungan. *Jurnal Bioedukasi*, 6(2), 337–347. <https://doi.org/10.33387/bioedu.v6i2.7305>
- Yuliandra, R., Gumantan, A., & Pratomo, C. (2023). *Meningkatkan Motorik Kasar Anak Usia Dini Ditinjau dengan Model Permainan Ladder*. 7(4), 4190–4198. <https://doi.org/10.31004/obsesi.v7i4.4391>
- Zega, K. B., & Suprihati, W. (2021). *Pengaruh Perkembangan Kognitif Pada Anak*. 3(1), 17–24.

How to cite this article:

Munasti, A., Zuama, S. N., Marie, H., & Durrotunnisa. (2026). Development of Jump Number Play Media in Stimulating Children's Cognitive Development. *Journal of Educational Sciences*, 10(3), 96-106.
