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The current situation of forming number symbols for children aged 3-6 according to the Montessori Method in independent preschool education institutions in Tuyen Quang City

Huong Nguyen Thi

Faculty of Preschool and Primary Education, Tan Trao University, Vietnam

* Corresponding Author: **Huong Nguyen Thi**

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Abstract

This study examines the current situation of forming number symbols for children aged 3-6 using the Montessori Method in independent preschool education institutions in Tuyen Quang city, Tuyen Quang province. Survey results indicate that the awareness level of number symbols among children using the Montessori Method is primarily at an average and weak level. The main reason is that most preschool teachers struggle when using specialized math teaching aids and when planning math lessons for children, relying solely on the researched curriculum content for preschool teachers, uniformly designed for all children of the same age without considering differences in abilities, strengths, speeds, etc., to create the most suitable learning program for each child. This approach leads to a situation where children find lessons boring due to teacher requirements being either too low or too high. As a result, the author proposes several measures to form number symbols for children aged 3-6 using the Montessori Method in the surveyed area.

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1. Introduction

In the trend of international integration and fundamental comprehensive educational innovation, the application of advanced teaching perspectives in the process of caring for and educating children is essential.

The Montessori Method has been noticed and used by educators in the process of educating young children at independent preschool education institutions both domestically and international, especially in major cities. The Montessori Method is a pedagogical method of educating children based on the research and experience of Italian doctor and educator Maria Montessori. The Montessori Method emphasizes the child's freedom of activity within a prepared environment. Therefore, Montessori has established a classroom environment with various activity areas, ensuring satisfaction of the exploration needs, tailored to the abilities and conditions of each child. Among these, the Mathematics area is considered a highly academic activity equipped with specialized math teaching aids. It can be said that mathematics is present in every aspect of human life. Therefore, the formation of mathematical symbols for preschoolers holds a particularly important position as a subject widely applicable in the practical realities of life. It serves as a versatile key to the development of numerous scientific disciplines. In conjunction with mathematics in general, the creation of number symbols for preschoolers plays a special role in intellectual education. It lays the foundation for cognitive development, enhances the child's recognition abilities, contributes to overall personality development, and prepares the child for mainstream schooling.

To meet the developmental needs of society and address the concerns of parents within the community, independent preschools in Tuyen Quang city have been applying the Montessori Method in the process of forming number symbols for children aged 3-6. However, the majority of teachers, when planning to organize math teaching for children, tend to rely solely on the content of the researched preschool education curriculum, designed uniformly for all children of the same age without considering differences in abilities, strengths, speeds, etc.

This approach limits the child's perceptual abilities during activities. Therefore, the formation of number symbols for children aged 3-6 using the Montessori Method is a crucial task contributing to the current goals of preschool education in our country.

The article presents the survey results on the current status of forming number symbols for children aged 3-6 using the Montessori Method in some independent preschools in Tuyen Quang city. Based on the research findings, the author proposes solutions to overcome limitations and enhance the effectiveness of forming number symbols for children.

2. Research Results

2.1 Overview of the survey process

2.1.1. For teachers

- To understand the current status of forming number symbols for children aged 3-6 using the Montessori Method, we selected 40 preschool teachers instructing kindergarten classes for children aged 3-6 in two independent preschools: Casa Montessor Kindergarten and Bilingual Smart Montessori Kindergarten in Tuyen Quang. The survey took place from November 2022 to January 2023.
- The survey focused on the following issues: 1/ Understanding preschool teachers' perceptions of

forming number symbols for children aged 3-6 using the Montessori Method. 2/ Exploring methods and forms of forming number symbols for children.

- Survey methods included the use of questionnaires for preschool teachers, interviews, observations, and expert methods. Statistical analysis was conducted on the collected data using mathematical and statistical techniques.

2.1.2. For Children

- To understand the level of perception of number symbols among children aged 3-6, we conducted an investigation survey with 120 children aged 3-6 from 2 preschools in Tuyen Quang city, Tuyen Quang province. The survey took place from November 2023 to January 2024.
- Survey content: Understanding the level of perception among children aged 3-6 through learning activities based on the following criteria: + *Criterion 1*: Children's level of perception. + *Criterion 2*: Children's level of interest.
- Survey method: Utilizing a system of test exercises and employing observation and dialogue methods with children to determine their level of perception.
- Scoring method for the survey:

Table 1: Score

Levels	Score			
	4	3	2	1
Perception	Very necessary	Necessary	Normal	Unnecessary
Result	Good	Fair	Average	Weak
	$3.25 \leq \text{Average score} \leq 4.0$	$2.5 \leq \text{Average score} < 3.25$	$1.75 \leq \text{Average score} < 2.5$	$1 \leq \text{Average score} < 1.75$

2.2. Survey results

2.2.1. Teachers' perceptions regarding the role of forming number symbols for children aged 3-6 using the Montessori Method.

* Surveying the perceptions of preschool teachers regarding

the role of forming number symbols for children aged 3-6 using the Montessori Method, we obtained the following results:

Table 2: Teachers' perceptions regarding the role of forming number symbols for children aged 3-6 using the Montessori Method

No.	Result / Content	Average score	Standard deviation	Level
1	Children learn about "numbers" through their senses with specialized math teaching aids, which stimulate children's enthusiasm for exploration and discovery more actively	3.18	0.71	Necessary
2	Assisting children in understanding the concepts of quantity, numbers, and basic arithmetic operations becomes more straightforward	3.73	0.45	Very necessary
3	Assisting children in developing reasoning skills and sharpness in problem-solving, particularly fostering logical thinking in children	3.90	0.30	Very necessary
4	A mixed-age classroom will help children learn from and support each other	2.73	0.85	Necessary
5	Cultivate in children a sense of tidiness, order, and patience	2.73	0.85	Necessary
Average score		3.24	0.63	Necessary

Looking at the table above, we can see that forming number symbols for children using the Montessori Method plays a crucial role in the process of developing these symbols for children in preschools during the current developmental stage. The majority of surveyed teachers believe that applying the Montessori Method in forming number symbols for children in preschools helps them engage actively, explore, and experience mathematical knowledge through their senses. This lays the foundation for developing concepts related to sets, numbers, and counting in the early stages of a child's mathematical learning. The integration of different age groups in the classroom is seen as beneficial, as older

children assist younger ones. This is a distinctive feature in Montessori classrooms and contributes to instilling qualities such as orderliness, discipline, and patience in the children's learning process. Thus, among the surveyed teachers, the majority choose the role of helping children develop reasoning skills and sharp problem-solving abilities, with an average score of 3.90. Ms. N.T.H (from Casa Montessori Kindergarten) stated: "Most of our preschool teachers recognize the importance of forming number symbols for children aged 3-6 using the Montessori method. However, achieving this requires the attention and support of educators".

2.2.2. The current situation of organizing activities for forming number symbols for children aged 3-6 using the Montessori method at Casa Montessori Kindergarten and Smart Montessori Bilingual Kindergarten in Tuyen Quang city

2.2.2.1. The current situation of teachers' perceptions regarding the content of forming number symbols for children aged 3-6 using the Montessori method

* Survey on the use of Montessori teaching aids in activities for forming number symbols for children aged 3-6.

Table 3: Teachers' perceptions on the use of Montessori teaching aids in activities for forming number symbols for children aged 3-6

No.	Result / Content	Average score	Standard deviation	Level
1	Numerical rods	3.38	0.90	Very necessary
2	Sandpaper numbers	2.75	0.95	Necessary
3	Spindle box	2.63	0.74	Necessary
4	Cut-out numeral and counters	3.88	0.33	Very necessary
5	Colored bead chains	3.65	0.70	Very necessary
6	Abacus - Division bead board	2.53	0.60	Necessary
Average score		3.13	0.70	Necessary

Most teachers believe that using teaching tools to form number symbols for children is essential. Ms. N.T.V stated, "Through specialized teaching tools, children understand the values of numerals and can easily perform calculations (addition, subtraction, multiplication, division) in an expanding range, from 1-10 to 100 and even to the thousands and tens of thousands range. This is something that many educators find challenging to imagine how preschoolers can accomplish such extensive calculations. In Montessori classrooms, children can do this because they have been provided with an environment equipped with precise, systematic, and logical math teaching aids. Particularly, children follow the principles of the Montessori method, which means they learn numbers through sensory experiences with specific teaching aids". Among the teaching

aids, the set of sandpaper numbers, spindle box, and abacus-division bead board achieve an average score of 2.75, 2.63, and 2.53, respectively, indicating a moderate level of necessity. Notably, the set of number rods, numerals and cut-out numeral and counters, and colored bead chains are highly rated by teachers, achieving an average score of 3.38, 3.88, and 3.65. These teaching aids are deemed very useful in teaching decimal systems, basic arithmetic operations, and serve as a foundation for advanced mathematical learning, especially in preparing children for subsequent grade levels.

* Preschool teachers' perceptions on the formation of number symbols for children aged 3-6 using the Montessori method. Surveying the implementation of content in forming number symbols for children aged 3-6 using the Montessori method, we obtained the following results:

Table 4: Teacher perceptions on the content of forming number symbols for children aged 3-6 using the Montessori method

No.	Result / Content	Average score	Standard deviation	Level
1	Introducing counting numbers from 0 to 10.	3.73	0.45	Very necessary
2	Decimal system	2.53	0.82	Necessary
3	Four basic operations with colored beads	3.05	0.96	Necessary
4	Linear counting	2.75	0.90	Necessary
Average score		3.01	0.78	Necessary

Through the survey results in the table above, it is evident that the majority of teachers and administrators believe that the content of forming number symbols for children aged 3-6 according to the Montessori Method is extremely important and necessary. This is because Mathematics is a subject present in all scientific aspects of life. Through direct discussions with teachers, most agree that the activities in the first content "introducing counting numbers from 0-10" and the third content "teaching children basic operations" (addition, subtraction, multiplication, division) are developed by Montessori based on the strengths and developmental pace of each individual child, and are systematically and logically implemented, with an average score of 3.73 and 3.05, respectively. For the content of teaching children "decimal system" and "linear counting" the average scores are 2.93 and 2.95. Thus, most teachers in both schools recognize the necessity of teaching these contents to prepare children for a foundational understanding of mathematics. The principal of

Smart Montessori Kindergarten, Mrs. L.T.T, mentioned that "children learn in Montessori classrooms starting from concrete experiential journeys, followed by a gradual progression from simple to complex (most lessons prepare for the next step), and finally, lessons are conducted step by step. Therefore, we can see that the content of forming quantity for children aged 3-6 according to the Montessori Method is crucial in the process of teaching mathematics in preschool".

2.3.2.2. Current situation of teachers using methods and forms to organize number symbols for children aged 3-6 according to the Montessori Method in casa Montessori kindergarten and smart Montessori bilingual kindergarten in Tuyen Quang

* The current situation of teachers using methods to form number symbols for children aged 3-6 according to the Montessori Method

Table 5: The current situation of teachers using methods to form number symbols for children aged 3-6 according to the Montessori Method

No.	Result / Content	Average score	Standard deviation	Level
1	The teaching method is based on the general principles of the method of educating children.	1.78	0.58	Normal
2	Based on traditional teaching methods	2.15	0.66	Normal
3	Based on the principles of the Montessori teaching method	1.85	0.53	Normal
4	Experiential learning method	3.50	0.82	Very necessary
Average score		2.32	0.65	Average

According to the survey results in Table 4, overall, we observe that teachers often seek and apply various methods in the process of forming number symbols for children, but there is still unevenness. The method of teaching based on the general principles of the method of educating children is rated the lowest by teachers with an average score of 1.78, at a medium level. This is a method that is considered necessary in the field of education. Additionally, the experiential learning method is the most chosen and highly rated by the majority of preschool teachers with an average score of 3.50, at a relatively good level. Through discussions with Montessori preschool teachers, it is evident that in addition to applying advanced teaching methods, teachers in Montessori classrooms still ensure the inheritance of traditional teaching methods, with an average score of 2.15. Moreover, to achieve higher effectiveness, teachers rely on the principles of Montessori teaching to develop methods that are suitable for children, with an average score of 1.85.

Discussing with H.T.T.H (Smart Montessori Bilingual Kindergarten) and teacher L.T.M (Casa Montessori Kindergarten), both mentioned that “the uneven use of teaching methods is due to some teachers who have not received formal Montessori training but have learned through sharing experiences with colleagues, online resources, books, etc., resulting in many difficulties during implementation”. Wanting to delve deeper into this issue, we discussed with the leadership of both schools (Smart Montessori Bilingual Kindergarten and Casa Montessori Kindergarten). We learned that only 50% of preschool teachers in these institutions have participated in Montessori Method certification courses. In the future, the schools plan to continue sending teachers for training and development in the Montessori education program to meet the societal demands. * The current situation of teachers using various methods to develop number symbols for children aged 3-6 according to the Montessori Method

Table 6: The current situation of teachers using various methods to develop number symbols for children aged 3-6 according to the Montessori Method

No.	Result / Content	Average score	Standard deviation	Level
1	Through learning activities	4.00	0.00	Very necessary
2	Through experiential activities	3.00	0.39	Necessary
3	Through fun activities	2.53	0.72	Necessary
4	Through labor activities	1.80	0.65	Normal
5	Through walking and sightseeing activities	1.83	0.38	Normal
6	Through outdoor activities	1.75	0.44	Normal
Average score		2.48	0.43	Average

Looking at Table 5, it is evident that the majority of teachers believe that forming number symbols for children aged 3-6 is accomplished through various activities at the preschool. However, the choices of forms differ. Specifically, teachers' opinions are centered around the form through learning activities, with an average score of 4.00 (100%), reaching the maximum score. The form through experiential activities has an average score of 3.00, while the form through play activities has an average score of 2.53. They consider these as the most effective ways to develop number symbols for children, enabling them to apply learned knowledge and skills to solve real-life situations effectively. For instance, through fun activities like role-playing themed games, such

as a “store game” where children inquire about prices, use substitute bills instead of real money, count the money they pay to the shopkeeper, etc. Or, children learn license plate numbers, house numbers, find TV frequencies, understand the meaning of numbers used in daily life. Therefore, these results show that most teachers from both schools focus on math classes when forming numerical symbols for children. Teaching through other forms is less common. This is also a reason why we want to investigate the current situation, based on which we propose some measures for forming numerical symbols for children aged 3-6 using the Montessori method to achieve higher effectiveness.

Table 7: Current status of planning skills for forming number symbols for children 3-6 aged 3-6 according to the Montessori Method

No.	Result / Content	Average score	Standard deviation	Level
1	Step 1: Plan the lesson	1.95	0.68	Normal
2	Step 2: Prepare suitable teaching aids	3.15	0.58	Relatively good
3	Step 3: Determine the purpose of the lesson	2.03	0.48	Normal
4	Step 4: Implement the formation of number symbols according to the Montessori method (using the 3-step lesson)	1.98	0.62	Normal
5	Step 5: Evaluate the process of forming number symbols according to the Montessori method	1.93	0.42	Normal
Average score		2.21	0.55	Average

2.3.2.3. Current situation of planning skills to form number symbols for children aged 3-6 according to the Montessori Method at Casa Montessori Kindergarten and Smart Montessori Bilingual Kindergarten at Tuyen Quang city

* Current situation of planning skills to form number symbols for children 3-6 aged 3-6 according to the Montessori Method Looking at Table 6, it is evident that most teachers believe planning is an indispensable step before engaging in any activity at the preschool. They emphasize that a purposeful and systematic plan makes teachers more proactive during implementation. Therefore, the majority of teachers apply the Montessori Method in their planning based on the suggested curriculum. However, there are still challenges and specific difficulties when organizing activities for children to form numerical symbols. The average overall score for the planning steps is 2.21 (medium), indicating that teachers generally perform at a normal level. The average scores for individual planning steps are as follows: Step 1 (Plan the lesson) is 1.95, Step 3 (Determine the purpose of the lesson) is 2.03, Step 4 (Implement the formation of number symbols according to the Montessori Method) is 1.98, and Step 5 (Evaluate the process of forming number symbols according to the Montessori Method) is 1.93. In Step 2 (Prepare suitable teaching aids), the average score is higher at 3.15. When asked, teachers mentioned that the availability of visually

appealing, diverse, and abundant teaching aids facilitates the planning process. In case of shortages, teachers can substitute with self-made classroom materials.

Through discussions with Ms. N.T.H.Y from Casa Montessori Kindergarten, it was revealed that some teachers lack a genuine understanding of the principles and philosophy of Montessori education. Consequently, their implementation is tentative, and work cycles are still disjointed.

2.2.3. Current situation of number symbol awareness of 3-6 year old children following the Montessori method at casa Montessori Kindergarten and Smart Montessori Tuyen Quang Bilingual Kindergarten

* Current situation of number symbol awareness of 3-6 year old children following the Montessori Method at Casa Montessori Kindergarten and Smart Montessori Tuyen Quang Bilingual Kindergarten

Based on the synthesis of children's test scores, we categorized the level of formation of number symbols into four categories: Good, Fair, Average, and Weak, corresponding to the proposed rating scale.

The results of the investigation into the formation level of number symbols for 3-6 year-old children are presented in the table below:

Table 8: Current situation of 3-6 year-old children's awareness of number symbols using the Montessori Method

No.	Result Content	Average score	Standard deviation	Level
1	Understand counting, determine quantity, match corresponding quantities (1:1), read numbers within the scope of the lesson, and according to the child's ability	2.17	0.47	Average
2	The child can write numbers within the scope of the lesson and according to their ability.	2.14	0.52	Average
3	Perform basic arithmetic operations according to the child's ability	2.05	0.29	Average
Average score		2.12	0.43	Average

Looking at the comprehensive table, we can see that the level of formation of number symbols for children aged 3-6 using the Montessori method is not high. Specifically, the level where children understand counting, determine quantity, match numbers with corresponding quantities, and the level where children can read numbers according to their ability have average scores of 2.17 and 2.14, respectively. Thus,

based on the results of the children's test exercises, we observed that they primarily know how to count, determine quantity, and associate numbers with corresponding quantities within the range of numbers they have learned. However, they face difficulties in performing arithmetic operations (addition, subtraction, multiplication, division), with an average score of 2.05, which is relatively lowe.

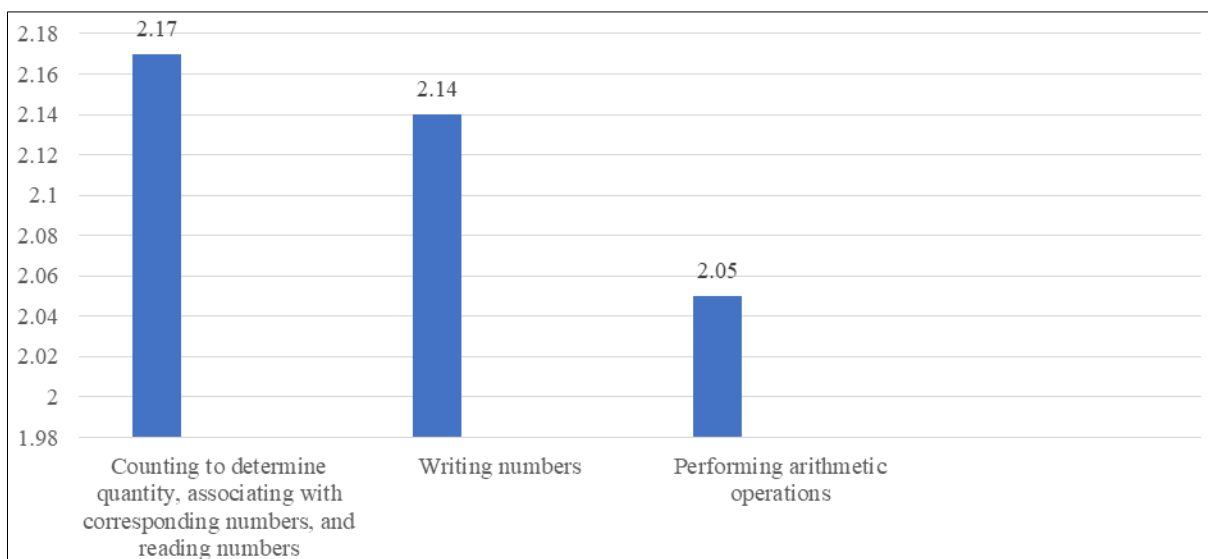


Fig 1: Current status of number symbol awareness level of children aged 3-6 according to the Montessori Method

Through the chart, it is evident that the ability to comprehend number symbols in children using the Montessori method is still not high. Particularly, basic arithmetic skills are lower compared to counting, reading, and writing numbers, with an average score of 2.05. The reasons for this situation include teachers, during the organization of number symbol formation classes, focusing only on providing knowledge about numerical symbols and quantities. Additionally,

teachers have not paid attention to the developmental pace of children at each age, leading to an absence of appropriate planning. Furthermore, there is a lack of emphasis on encouraging children to apply acquired knowledge and skills in real-life situations.

* The current situation of interest of children participating in number symbol formation activities of children aged 3-6 using the Montessori Method.

Table 9: The current situation of interest of children participating in number symbol formation activities of children aged 3-6

No.	Result / Content	Average score	Standard deviation	Level
1	Children actively and independently engage in learning activities and make an effort to complete tasks.	2.11	0.53	Average
2	Children pay attention, listen, understand, and remember the instructions provided by the teacher	2.09	0.47	Average
3	Children find joy in participating in activities	2.08	0.69	Average
4	Children express a desire to extend the duration of activities	2.10	0.64	Average
Average score		2.09	0.58	Average

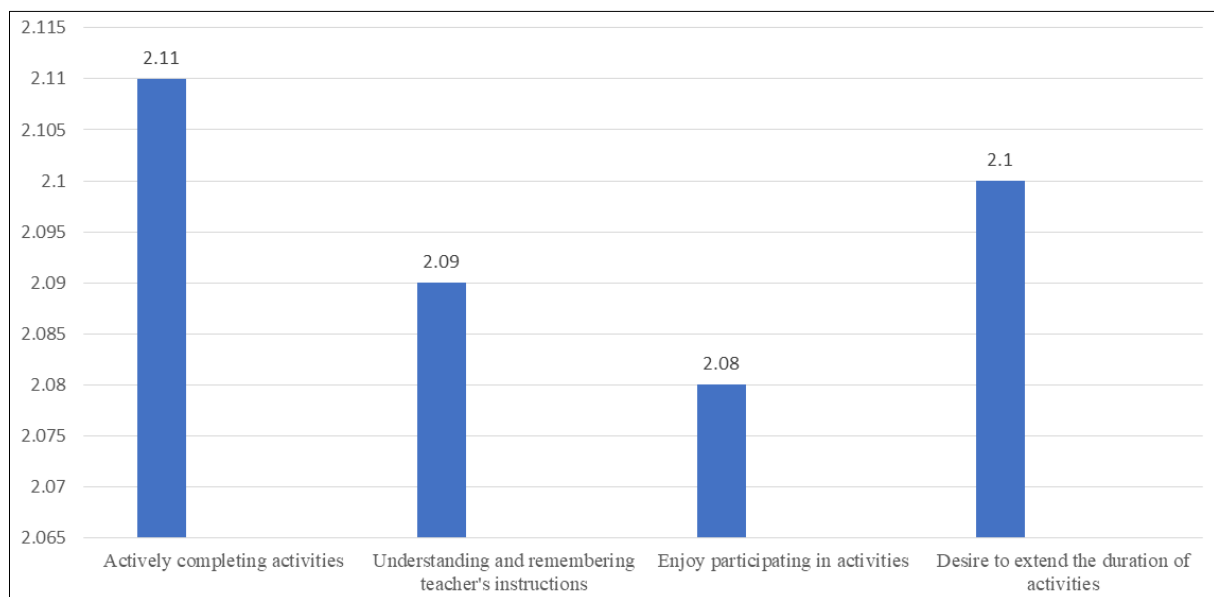


Fig 2: Current situation of children's interest level during participation in mathematics lessons using the Montessori method

The observation and participation in some activities related to the formation of number symbols in children generally show that children are interested in participating in purposeful mathematical activities, especially in the process of forming number symbols. However, there are times when children are actively engaged and eager in activities, but at other times, they may be indifferent or forgetful of the teacher's instructions. Specifically, the average scores for the following aspects are: Actively and independently completing learning activities - 2.11; Paying attention, understanding, and remembering the teacher's instructions - 2.09; Children enjoying participation in activities - 2.08; Desire to extend the duration of activities - 2.10. Overall, these scores indicate a predominantly moderate level of interest. This suggests that under the influence of teachers, especially those with good pedagogical skills, children are very active in the process of activities related to numerical symbols. However, direct observation during class hours reveals that only some children actively listen but do not necessarily actively retain knowledge, alternating between remembering and forgetting. Thus, the children's interest appears to be somewhat volatile, emerging quickly and dissipating rapidly.

In summary, the selection and proposal of certain

pedagogical measures are necessary conditions to enhance the effectiveness of forming mathematical symbols in general and numerical symbols for children aged 3-6 in particular.

3. Conclusion

The research results on the current situation of forming number symbols for children aged 3-6 according to the Montessori Method in some independent preschools in Tuyen Quang city show that the level of children's perception of numerical symbols is at an average level, accounting for a significant proportion. The majority of children are classified as average in all criteria, with a percentage above 50%. Most preschool teachers still struggle when using specialized math teaching aids and when planning math lessons for children, they rely solely on the content of the researched preschool education program, applying it uniformly to all children of the same age without considering the differences in children's cognitive levels to design appropriate learning programs. Therefore, finding suitable measures to overcome these limitations is the focus of research on the application of methods to form numerical symbols for children aged 3-6 according to the Montessori Method by teachers in preschools, aiming to enhance effectiveness for children."

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