# Improving Fine Motor Skills of Cerebral Palsy Children Through Maze Game Media

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The Maze game media helps children develop their fine motor abilities, such as flexing their fingers and wrists, as well as fine motor skills related to both hands' movement capabilities and the capacity to combine eye awareness and hand activity. The purpose of this study is to examine how effective maze game media enhances fine motor abilities in children with Cerebral Palsy aged 3 to 8 years at the Type D South Jakarta Disability School. This research utilizes an action research methodology. Action research is a cyclical methodology focused on diverse acts or interventions implemented by researchers in their capacity as classroom educators. The research encompassed the design phase through to the assessment of practical classroom interventions aimed at improving the fine motor abilities of students affected by cerebral palsy. During the 2023-2024 academic year, researchers examined children's fine motor skills through labyrinth game media in the classroom. The research was conducted in three phases: the pre-cycle, cycle 1, and cycle 2. The results of the researh revealed that regression of fine motor skills through maze game media is 0.926 (R2: 0.858). Meanwhile, the improvement of fine motor skills of children with Cerebral Palsy through the maze game media obtained significant results based on the T count α 0.05, which is -2.394, which is greater than the T Table (1.812461) so that there is an increase in fine motor skills of children with Cerebral Palsy through the media, the maze game is effectively negative or tends to be low.

**Keywords: Fine Motor Skills and Maze Game Media**

## Introduction

The incidence and prevalence of birth-related brain injuries worldwide that ultimately lead to permanent motor impairments in children is unknown. Cerebral palsy (CP), the most common neuromotor condition affecting children, is most prevalent in developing countries. (1). The permanent mobility disability known as CP is caused by brain injury during pregnancy or the postnatal period up to 5 years of age [2]. Approximately 75% of children with CP can walk, but many of these children are physically unable to keep up with their peers because they cannot walk quickly and smoothly and are more prone to tripping and falling (3)

In its various forms, Cerebral Palsy (CP) is a non-progressive condition that develops during prenatal or early childhood brain development. It is characterized by modifications in movement, posture, and tone, resulting in developmental potential. (4)

A series of persistent and non-reversible developmental problems are referred to as Cerebral Palsy (CP); it mainly affects posture and accessibility (Bax et al., 2005), which impacts daily activities and associated secondary disorders such as cognitive, linguistic, and visual impairments (Odding et al., 2006). According to Novak et al. (2013), CP is thought to be the most common cause of physical impairment in children. Importantly, CP is a permanent, non-progressive, and lifelong neurological disorder. Considering the body topography of the lesion,

CP can be categorized into two main categories: bilateral and unilateral (Rosenbaum et al., 2007; Graham et al., 2016). On the other hand, children with disabilities also have unique neurological damage and difficulties in coordinating movement.

The reason the researcher took this research was to stimulate and move the fine motor skills of children with cerebral palsy through maze game media and to grow the concentration of children with cerebral palsy in moving the pencil following the flow in the maze activity sheet and the maze game media flow board so that children with cerebral palsy can train their motor movements independently in the future. Rosidah's research (2014) substantiates the notion that maze game training enhances children's visual-spatial intelligence. , which indicates that maze game training can enhance children's visual-spatial intelligence. The children's spatial intelligence score of 77.7% is evident from the average increase of 33.43% from Cycle I. Before the child took action, the initial average state of visual-spatial intelligence was 44.27%. The mean value of children's visual-spatial intelligence recorded in cycle II was 84.89%, which then increased by 7.19% following cycle II. This study shows that playing games like mazes can improve visual-spatial intelligence. Using various media to play maze games every day and inviting group members to do individual activities.

This study focuses on Improving Fine Motor Skills of Cerebral Palsy Children Through Maze Game Media for Grades 1 and 2 of SDLB YPAC, South Jakarta City, DKI Jakarta Province, Academic Year 2020/2021, which includes the following aspects: 1) Ability to identify maze path images, 2) Ability to move fingers independently and 3) Control finger movements.

This research is in the form of classroom action research which generally aims to collect data related to Improving Fine Motor Skills of Grades 1 and 2 of SDLB Students in the 2023/2024 Academic Year. The specific objectives of this study are as follows:

1. To determine the fine motor skills of Cerebral Palsy children before using maze-shaped labyrinth game media in grades 1 and 2 of SDLB YPAC, South Jakarta City, DKI Jakarta Province, Academic Year 2023/2024.
2. To find out the steps for playing maze media for Cerebral Palsy children in grades 1 and 2 at SDLB YPAC, South Jakarta City, DKI Jakarta Province, Academic Year 2021/2022.
3. Analyze the effectiveness of maze games media in improving fine motor skills in children with Cerebral Palsy in grades 1 and 2 at SDLB YPAC, South Jakarta City, DKI Jakarta Province, 2023/2024 Academic Year.

The novelty of this study lies in the achievement levels of eye-hand coordination and hand-hand coordination development, which utilizes the natural finger muscles at a rate of 75 percent, progressing as anticipated. Additionally, it examines the psychosocial factors affecting children with cerebral palsy.

## Theoretical Study

Children with Cerebral Palsy can have varying levels of fine motor function, and the Bimanual Fine Motor Function (BFMF) test has shown good construct validity. In addition, the Manual Ability Classification System (MACS) classification of manual performance in everyday life may differ from the BFMF classification of adequate motor capacity in terms of being useful for understanding potential differences between a child's ability to grasp, hold, and manipulate objects and typical manual performance.

Most children in this study had comparable BFMF and MACS levels, indicating that most children use their fine motor function (BFMF) when handling things in

everyday life (MACS). These potential differences are worth considering in children with additional subtypes of CP and unilateral spastic CP. The use of BFMF to categorize fine motor function based on the child's ability to grasp, hold, and manipulate in an environment that supports the child's best capacity, and the use of BFMF subclassifications (a) and (b) to provide information about potential differences in fine motor ability between the two hands (Beckung 2014).

Practicing maze games can improve children's visual-spatial intelligence. Children's spatial intelligence of 77.7% can be seen from the average increase from cycle I of 33.43%. Before the child acted, the initial state of the average visual spatial intelligence was 44.27%. The average score of children's visual spatial intelligence obtained in cycle II was 84.89% since then it increased by 7.19% after cycle II. This study shows that playing games such as mazes can improve visual-spatial intelligence. Using various media to do mazes every day, and inviting group members to do individual activities (Rosidah, L. 2014)

## Methods

The research method used is Kemis Taggart. This method was chosen because Kemis Taggart is a classroom action research; Action research is research that does not concern static things but rather its dynamic form, which wants a change towards a better direction from an educational practice carried out by teachers by taking actions in learning. The parties involved in classroom action research (teachers and researchers) consciously try and develop skills in detecting and solving problems that occur in classroom learning through actions in the sense that they can be calculated and solve problems and improve conditions. This research is carried out and observed carefully to measure its level of success. Classroom action research is part of action research, and action research is part of general research. Research is an investigation activity based on scientific or technological methods (Affandi, in 2011).

Researchers utilize correlation analysis to identify correlations between variables. This method was used to establish the correlation between the measurements of each variable. Researchers use a drop test to evaluate the effect of factors, especially the growth in fine motor skills, as a dependent variable, with maze game media serving as an independent variable.

## Results

Research on Improving Children's Fine Motor Skills Through Maze Games (Puzzles) at SDLB Type D YPAC South Jakarta in the 2023–2024 Academic Year was carried out in two cycles, where each cycle was carried out in eight meetings.

**Table 1 Fine motor skills of CP children based on maze game media**

| No. | RES | Cycle Pra (Beckung) | | Cycle 1 (Beckung) | | Cycle 2 (Beckung) | |
|---|---|---|---|---|---|---|---|
| | | learning achievement level | Description | learning achievement level | Description | learning achievement level | Description |
| 01 | Put | 28 | (Starting to Develop) | 29 | (Developing according to expectations) | 39 | (Developing very well) |
| 02 | Akb | 21 | (Not Yet Developed) | 25 | (Starting to Develop) | 34 | (Developing according to expectations) |
| 03 | Iqbl | 24 | (Not Yet Developed) | 30 | (Developing according to expectations) | 33 | (Developing according to expectations) |
| 04 | Blq | 26 | (Starting to Develop) | 35 | (Developing very well) | 29 | (Developing according to expectations) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 05 | Alk | 26 | (Starting to Develop) | 37 | (Developing very well) | 38 | (Developing very well) |
| 06 | Khns | 25 | (Starting to Develop) | 31 | (Developing according to expectations) | 37 | (Developing according to expectations) |
| 07 | Daz | 27 | (Starting to Develop) | 38 | (Developing very well) | 37 | (Developing according to expectations) |
| 08 | Rhn E.E. | 17 | (Not Yet Developed) | 36 | (Developing very well) | 37 | (Developing according to expectations) |
| 09 | Bb N. | 24 | (Not Yet Developed) | 29 | (Developing according to expectations) | 38 | (Developing very well) |
| 10 | And | 21 | (Not Yet Developed) | 25 | (Starting to Develop) | 31 | (Developing according to expectations) |
| ∑ class average | | 24 | ∑ class average | 30 | ∑ class average | 35.3 | |

It should be noted that fine motor skills in children with Cerebral Palsy increased after the intervention. Data on the increase in fine motor skills of children with CP from pre-intervention to cycle 2 are as follows: Based on the results of the study, it shows that the fine motor skills of children with CP based on the maze game media from pre-cycle to cycle 2 have increased (Table 1). The highest results were obtained by students Alaika (26–38) and Results/data poorly organized

## Figures and Tables

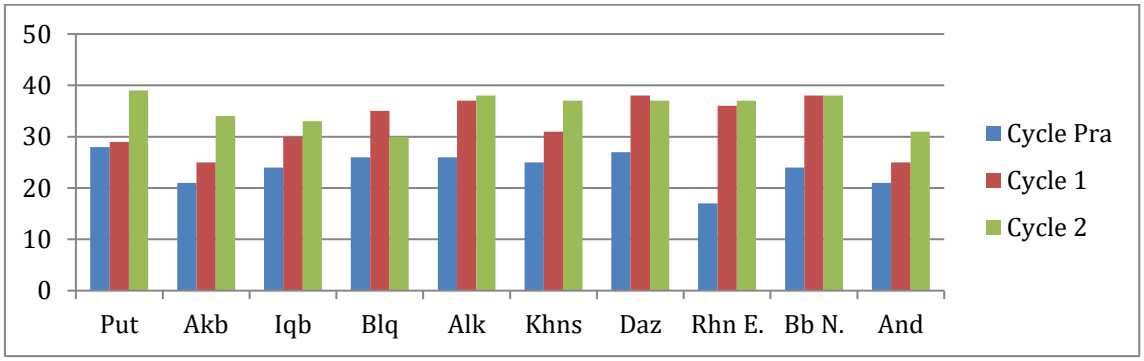


Figure 1 Corelation the fine motor skills based on Media Maze in Cerebral Palsy children at SDLB Type D YPAC South Jakarta from Pre-Cycle, Cycle 1 to Cycle 2 experienced a slight increase. Table 4.6 explains that the average TCP in Pre-Cycle was 24 TCP Max 40; in Cycle 1, the average TCP of children was 30 learning achievement level Max 40; in Cycle 2, the average learning achievement level of children reached 35.4 learning achievement level Max 40. The average learning achievement level of children from cycle 1 to cycle 2 increased by 5.4. While in cycle 2, the average learning achievement level for children was 35.3, from learning achievement level Max of 40; Thus, children with CP have achieved a minimum learning achievement level of 30. TCP was obtained by Putri with 39. In contrast, the lowest learning achievement level was obtained by Balqis with 29, not reaching learning achievement level Min 30.

The improvement experienced by children with CP This happened from cycle 1 to cycle 2 because researchers and collaborators used various methods in explaining to children that children are skilled at holding, grasping, and directing pencils with their fingers following the maze path found on the maze activity sheet. and animal-shaped maze boards. The systematic differences between capacity and performance found in

several subtypes of CP indicate that both aspects of hand function deserve attention. For children with unilateral spastic CP, the need to distinguish between adequate motor capacity and manual performance has been clinically recognized for both treatment planning and outcome evaluation (Facchin et al., 2011; Krumlinde-Sundholm & Eliasson, 2003), whereas little is known about the relationship between adequate motor capacity and manual performance for other subtypes of CP. Our results suggest that this topic needs further investigation.

Table 2 shows that the Regression and T-Test (Effectiveness) of the three research variables Based on the data above, the regression of fine motor skills through the contextual learning model based on maze game media is 0.926.

Table 2 Regression and T-Test (Effectiveness) of the three research variables are as follows:

**Model Summary**

| Model | R | R Square | Adjusted R Square 1) 2) 3) 4) 5) 6) 7) | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | ,926[a] | ,858 | ,818 | 21,56060 |

**Figure 1. Predictors: (Constant), Maze**

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| 1 (Constant) | -77,524 | 32,379 | | -2,394 | ,048 |
| Maze | 4,623 | 2,476 | 5,472 | 1,867 | ,104 |

**Figure 2. Dependent Variable: Motorik Halus**

Based on the coefficient analysis above, the effectiveness of increasing fine motor skills in the maze game media is -2.394 significant 0.048, it turns out that 0.05 (T count) is more significant than the Cronbach alpha T-table 0.05 (1.812461), so the effectiveness of fine motor skills in the maze game media tends to be hostile or weak.

## Discussion

Based on the results of data acquisition both qualitatively and quantitatively, this study shows that the maze game media can slightly improve the fine motor skills of CP children at SDLB Type D YPAC South Jakarta in the

2023-2024 Academic Year. The results of the study showed that fine motor skills through the maze game media in CP children increased from pre-cycle, cycle 1 and cycle 2. Then the increase in pre-cycle, the average TCP of children was 24 from TCP Max 40 and in cycle 1, the average TCP of CP children was 30 from TCP Max 40. The average TCP of CP children from pre-cycle to cycle 1 increased by 6 points. In cycle 1, there were 6 CP children who had achieved TCP min (Minimum Development Achievement Level) 75% of TCP Max 40, which was 30. Meanwhile, the 6 children were IQB 30, BLQ 35, ALK 37, KHN 31, DZL 38, and RHN 36. In addition, there were 4 children who had not achieved TCP Min 75% of TCP Max 40, namely PUT 29, AKB 25, BBY 29, and ADR 25.

With the use of maze media in the form of maze activity sheets and maze flow boards by parents and class teachers at school, children can train their memory or cognitive abilities independently and children achieve the understanding expected by parents so that cognitive coordination with fine motor skills can be achieved. From cognitive and fine motor skills achievements, children's desire to establish social relationships with fellow cerebral palsy children grows. This is in accordance with Suryawati's research (2010) that cognitive development achieves parental expectations, making it easier for cerebral palsy children to perform fine motor movements independently. Along with the use of maze game media, researchers also observe children through the pre-cycle stage, cycle 1 and cycle 2.

The results of cycle 1 for each cerebral palsy child are as follows: (1) Put, TCP week one is 24, TCP week two is 24, TCP week three is 26, and TCP week four is 26; (2) Akb, TCP week one is 19, TCP week two is 19, TCP week three is 24, and TCP week four is 24; (3) iqbl, TCP week one is 24, TCP week two is 24, TCP week three is 24 and TCP week four is 25; (4) Blqs, TCP week one is 22, TCP week two is 22, TCP week three is 30 and TCP week four is 30; (5) Alk, TCP week one is 13, TCP week two is 13, TCP week three is 24 and TCP week four is 24; (6) Khns, TCP of the first week is 24, TCP of the second week is 24, TCP of the third week is 24 and TCP of the fourth week is 25; (7) Dzl, TCP week one is 24, TCP week two is 24, TCP week three is 26 and TCP week four is 26; (8) Rhn, TCP week one is 19, TCP week two is 19, TCP week three is 24 and TCP week four is 26; (9) Bbi, TCP week one is 24, TCP week two is 24, TCP week three is 26 and TCP week four is 26; (10) Andr, TCP week one is 24, TCP week two is 24, TCP week three is 24 and TCP week four is 26. In the first and second weeks, TCP is classified as Not Developing. Furthermore, in the third to fourth weeks, TCP is classified as Starting to Develop. This is based on the conversion of maze game media scores in cycle 1.

From cycle 1 above, the researcher saw the development of understanding and memory of cerebral palsy students entered the category of starting to develop. This means that CP students can start to learn themes and contextual learning media even though they are still assisted by the class teacher. This can foster the psychosocial of cerebral palsy students to train their memory and fine motor skills simultaneously. Along with the growth of students' psychosocial, the researcher conducted a second cycle for cerebral palsy children.

The TCP obtained by each CP child in the pre-cycle is as follows: (1) Put, TCP for the first week is 23, TCP for the second week is 23, TCP for the third week is 33, and TCP for the fourth week is 33; (2) Akb, TCP for the first week is 16, TCP for the second week is 16, TCP for the third week is 25, and TCP for the

fourth week is 25; (3) iqbl, TCP for the first week is 19, TCP for the second week is 19, TCP for the third week is 29 and TCP for the fourth week is 29; (4) Blqs, TCP for the first week is 20, TCP for the second week is 20, TCP for the third week is 32 and TCP for the fourth week is 32; (5) Alk, TCP for the first week is 21, TCP for the second week is 21, TCP for the third week is 31 and TCP for the fourth week is 31; (6) Khns, TCP of the first week is 20, TCP of the second week is 20, TCP of the third week is 30 and TCP of the fourth week is 30, (7) Dzl, TCP of the first week is 20, TCP of the second week is 23, TCP of the third week is 32 and TCP of the fourth week is 32; (8) Rhn, TCP of the first week is 14, TCP of the second week is 14, TCP of the third week is 20 and TCP of the fourth week is 20; 9) Bbi, TCP week one is 18, TCP week two is 20, TCP week three is 27 and TCP week four is 30; (10) Andr, TCP week one is 16, TCP week two is 16, TCP week three is 26 and TCP week four is 26. In the first and second weeks, TCP is classified as Not Yet Developing. Furthermore, in the third to fourth weeks, TCP is classified as Starting to Develop. This is based on the conversion of fine motor skills scores in the pre- cycle.

Along with TCP, the fine motor skills of CP children are classified as Developing According to Expectations, researchers conducted a second cycle to achieve the category of Developing Very Well. In addition, there are also CP children who enjoy their own activities such as playing with toy cars. In this case, the teacher understands the attitude shown by the child. However, the teacher does not let the child's attitude last long.

After the teacher gave an explanation to the other CP children, the teacher approached the CP children. The teacher began to explain the activities carried out this time. It turned out that the CP children responded to the explanation given by the teacher. The children were not yet able to be invited to learn together, especially by using maze game media that had never been used before during learning. The teacher gave the children the opportunity to ask questions if there was a maze pattern that they did not understand. Of course, the teacher needs to use a way to make the children respond when the teacher will explain the maze pattern that will be taught the next day.

The TCP obtained by each CP child in the pre-cycle is as follows: (1) Put, TCP for the first week is 23, TCP for the second week is 23, TCP for the third week is 33, and TCP for the fourth week is 33; (2) Akb, TCP for the first week is 16, TCP for the second week is 16, TCP for the third week is 25, and TCP for the fourth week is 25; (3) iqbl, TCP for the first week is 19, TCP for the second week is 19, TCP for the third week is 29 and TCP for the fourth week is 29; (4) Blqs, TCP for the first week is 20, TCP for the second week is 20, TCP for the third week is 32 and TCP for the fourth week is 32; (5) Alk, TCP for the first week is 21, TCP for the second week is 21, TCP for the third week is 31 and TCP for the fourth week is 31; (6) Khns, TCP first week is 20, TCP second week is 20, TCP third week is 30 and TCP fourth week is 30, (7) Dzl, TCP week one is 20, TCP week two is 23, TCP week three is 32 and TCP week four is 32; (8) Rhn, TCP week one is 14, TCP week two is 14, TCP week three is 20 and TCP week four is 20; (9) Bbi, TCP week one is 18, TCP week two is 20, TCP week three is 27 and TCP week four is 30; (10) Andr, TCP week one is 16, TCP week two is 16, TCP week three is 26 and TCP week four is 26. In the first and second weeks, TCP is classified as Not Yet Developing. Furthermore, in the third to fourth weeks, TCP is classified as Starting to Develop. This is based on the conversion of fine motor skills scores in the pre- cycle.

Based on the data above, that fine motor skills in children with cerebral palsy are categorized as underdeveloped. This is influenced by a number of factors, including the development of the nervous system, physical abilities that limit the child's body movements, the child's desire to move is still low, the child's psychological condition to train the child's movements, the child's increasing age which limits the child's motivation to move his body and family support, especially the child's parents in growing the child's confidence to move (Hurlock, 1999). Along with the child's limitations in moving his body, parents should motivate their children to train the motor movements of cerebral palsy children at home and do physical therapy at the child development center located in a number of hospitals or clinics closest to the parent's domicile. The media for training children's body movements are maze activity sheets and maze flow boards.

With the use of maze media in the form of maze activity sheets and maze flow boards by parents and class teachers at school, children can practice fine motor movements independently and show fine motor development that meets the expectations of parents and class teachers. This is in accordance with research conducted by Beckung (2014) that the development of fine motor skills meets the expectations of parents. Along with the use of maze game media, researchers also observe children through a gradual contextual learning model, namely the pre-cycle stage, cycle 1 and cycle 2.

As for the pre-cycle, the researcher found that there were fine motor weaknesses in CP students at SDLB type D YPAC Jakarta. This can be seen from the average TCP pre-cycle results of 24 from TCP Max 40. From these results, the researcher conducted stimulation or intervention in the form of maze activity sheets in cycle 1. The results of cycle 1 for each cerebral palsy child are as follows: (1) Put, TCP week one is 25, TCP week two is 25, TCP week three is 32, and TCP week four is 32; (2) Akb, TCP week one is 20, TCP week two is 20, TCP week three is 305, and TCP week four is 30; (3) iqbl, TCP week one is 25, TCP week two is 25, TCP week three is 35 and TCP week four is 35; (4) Blqs, TCP week one is 30, TCP week two is 36, TCP week three is 36 and TCP week four is 36; (5) Alk, TCP week one is 35, TCP week two is 35, TCP week three is 39 and TCP week four is 39; (6) Khns, TCP week one is 30, TCP week two is 30, TCP week three is 30 and TCP week four is 34, (7) Dzl, TCP week one is 36, TCP week two is 36, TCP week three is 40 and TCP week four is 40; (8) Rhn, TCP week one is 36, TCP week two is 36, TCP week three is 36 and TCP week four is 36; (9) Bbi, TCP in the first week is 36, TCP in the second week is 36, TCP in the third week is 40 and TCP in the fourth week is 40; (10) Andr, TCP in the first week is 25, TCP in the second week is 25, TCP in the third week is 25 and TCP in the fourth week is 25. In the first and second weeks, TCP is classified as Starting to Develop. Furthermore, in the third to fourth weeks, TCP is classified as Developing According to Expectations. This is based on the conversion of fine motor ability scores in cycle 1.

Furthermore, in cycle 1, the average TCP of children was 30 from TCP Max 40 and in cycle 2, the average TCP of children was 35.3 from TCP Max 40. The average TCP of children from cycle 1 to cycle 2 increased by 5.4 points. In cycle 2, there were 9 who had achieved TCP Min (Minimum Development Achievement Level) 75% of TCP Max 40, which was 30. The ten children were PUT 39, AKB 34, IQB 33, ALK 38, KHN 37, DZL 37, and RHN 37, BBY 38, and ADR 31. In cycle 2, the child who obtained the highest TCP was PUT 39 and the child who obtained the lowest TCP was BLQ 29. In cycle 2, the child who obtained the

lowest TCP was because the child still gave a slightly unstable emotional response and his concentration was slightly awake.

This study was conducted in two cycles. The level of achievement of fine motor development of Cerebral Palsy students aged 5 to 8 years in SDLB type D (Spastic dipelgia and hemipelgia) was carried out before the study (need assessment and pre-cycle), cycle and cycle 2. The results of the study showed an increase in fine motor skills through a maze game media.

## Conclusion

The study of fine motor skills based on maze game media in CP children at SDLB Type D YPAC South Jakarta in the 2021-2022 academic year was carried out in two cycles where this study applied contextual learning steps that could improve fine motor skills in students. There was an increase in Fine Motor Skills towards the Contextual Learning Model Based on Effective Maze Game Media which tended to be hostile or low.

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