



Enhancing Eye–Hand Coordination in Early Childhood through Sensorimotor Play with Clamp Media: A Classroom Action Research

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ABSTRACT

Eye–hand coordination is a fundamental component of fine motor development, underpinning essential skills such as writing and cutting, and therefore needs to be optimally stimulated from an early age. However, many early childhood learners still demonstrate limited visual–motor integration, indicating the need for effective and engaging learning strategies. This study aims to improve the eye–hand coordination of children aged 4–5 years through the application of a sensorimotor play method using clamp media. The research employed a Classroom Action Research (CAR) design based on the Kemmis and McTaggart model, conducted in two cycles. The participants consisted of 18 children enrolled in Raudhatul Athfal. Data were collected through observation, documentation, and performance-based assessment, and analyzed descriptively across each cycle. The results revealed a significant improvement in children’s eye–hand coordination from the initial condition to the end of the second cycle. The use of clamp media proved effective in stimulating visual–motor coordination, as it required children to perform precise gripping, transferring, and controlled hand movements in response to visual stimuli. Furthermore, children demonstrated increased focus and better integration between visual perception and motor control. In conclusion, the implementation of sensorimotor play using clamp media is an effective and practical strategy for enhancing eye–hand coordination and supporting fine motor development in early childhood. It is recommended that educators incorporate similar interactive and manipulative media to create more engaging and developmentally appropriate learning experiences.

Keywords: *Clamp Media, Early Childhood, Eye–Hand Coordination, Sensorimotor Play*

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INTRODUCTION

Early childhood represents a critical developmental period often referred to as the golden age, during which children experience rapid growth across multiple domains, including cognitive, physical, and socio-emotional aspects (Innes et al., 2023; Nurfahma et al., 2024; Sari et al., 2023). At this stage, appropriate and continuous stimulation is essential to support optimal development. One of the fundamental aspects that requires early stimulation is eye–hand coordination, which plays a crucial role in enabling children to perform daily functional tasks effectively (Monoarfa et al., 2025). This ability serves as the foundation for various fine

motor skills, including writing, drawing, cutting, and object manipulation (Aiyawati, 2024). Without adequate stimulation, children may encounter difficulties in achieving developmental milestones necessary for school readiness.

Eye–hand coordination is closely associated with children’s independence and academic preparedness. As emphasized by Oberer et al., (2018), the ability to synchronize visual input with motor actions significantly influences children’s readiness to engage in structured learning activities. This coordination involves multiple components, including precision, flexibility, control, and agility, which must function in an integrated manner (Andari & Anadhi, 2023; Asmuddin et al., 2022; Kamil, 2023). However, despite its importance, empirical observations indicate that many early childhood learners still demonstrate low levels of visual–motor integration. This issue has become increasingly concerning, particularly in the context of modern lifestyle changes, where excessive exposure to digital devices may limit opportunities for direct physical interaction and motor practice.

Preliminary observations conducted in a Raudhatul Athfal classroom revealed that children aged 4–5 years still exhibit suboptimal eye–hand coordination. Several children showed difficulties in performing tasks requiring precise motor control, such as grasping, placing, or manipulating objects accurately. These limitations suggest that existing learning practices may not yet provide sufficient stimulation to support the development of visual–motor skills. If not addressed, such conditions may hinder children’s readiness for more advanced learning stages.

One of the most effective approaches to stimulate early childhood development is through play-based learning. Play is a natural and meaningful activity for children, involving active engagement of the senses, imagination, and physical movement (Nurhalisa et al., 2024). It contributes not only to physical development but also to emotional, social, and cognitive growth (Derri et al., 2001; Farida, 2016). From an Islamic perspective, play is also recognized as an essential part of child development, as illustrated in a narration of the Prophet Muhammad (peace be upon him), who demonstrated affection and understanding toward children’s play activities. This highlights that play is not merely recreational but also pedagogically valuable in fostering holistic development (Jimatul, 2022; Jirout et al., 2019).

Among various play-based approaches, sensorimotor play has been widely recognized as an effective strategy for enhancing coordination skills. Sensorimotor play integrates sensory input such as visual and tactile stimuli with motor responses, enabling children to actively explore and interact with their environment (Piaget, 1952; Syahira & Widya, 2025). This approach encourages active learning and supports the development of coordination between sensory perception and physical movement (Rudd et al., 2017). Through repeated and structured activities, children can gradually refine their motor control and improve their ability to coordinate visual and physical actions.

In this context, the use of clamp media (e.g., clothespins) offers a simple yet effective tool to support sensorimotor play. Clamping activities require children to use specific finger muscles, particularly the thumb, index, and middle fingers, thereby strengthening fine motor control and improving coordination (Ainurrofik, 2022). In addition, such activities involve precise movements such as gripping, transferring, sorting, and arranging objects, which directly stimulate eye–hand coordination (Čoh, 2021; Nazri et al., 2024; Sinaga & Aguss,

2021). The practicality, affordability, and flexibility of clamp media make it highly suitable for implementation in early childhood learning environments. Several empirical studies have demonstrated the effectiveness of manipulative play activities in improving children’s eye–hand coordination. Research by Harsismanto et al. (2021) found that fine motor activities involving gripping and transferring objects significantly enhanced visual–motor integration in early childhood learners. Similarly, Fitriani & Adawiyah (2018), reported that repetitive use of simple tools such as clothespins can strengthen finger muscles and improve precision in coordinated movements. These findings indicate that structured and repetitive motor activities play a crucial role in developing coordination skills, particularly when children are actively engaged in hands-on learning experiences.

In addition, studies focusing on sensorimotor play approaches have shown positive impacts on children’s developmental outcomes. Astika et al., (2023) revealed that sensorimotor-based activities not only improve fine motor skills but also enhance children’s concentration and task engagement during learning. Furthermore, Winarto et al., (2020) emphasized that integrating sensory stimulation with motor activities allows children to develop coordination more naturally through experiential learning processes. This suggests that sensorimotor play provides a holistic learning experience by combining physical movement with sensory exploration.

However, despite the growing body of research on fine motor development and sensorimotor play, there is still limited evidence regarding the specific use of clamp media within a structured Classroom Action Research design. Most previous studies have focused on general manipulative tools or broad play strategies without systematically evaluating the improvement process across iterative learning cycles (Diyenti, 2021; Roffey, 2009). Therefore, this study seeks to fill this gap by implementing and analyzing sensorimotor play using clamp media through a cyclical intervention approach, providing more comprehensive insights into its effectiveness in enhancing eye–hand coordination in early childhood.

Previous studies have highlighted the effectiveness of manipulative and repetitive activities in enhancing fine motor development (Farida, 2016; Sayfi’i & Ilmayanti, 2021; Sulistiyowati et al., 2023). However, there is still a lack of research that specifically examines the systematic application of sensorimotor play using clamp media within a Classroom Action Research framework. This gap indicates the need for empirical studies that not only implement such interventions but also evaluate their effectiveness through iterative cycles of improvement.

Therefore, this study aims to improve the eye–hand coordination of children aged 4–5 years through the implementation of sensorimotor play using clamp media. This research also seeks to provide a comprehensive description of the learning process and outcomes, particularly in enhancing children’s fine motor skills through engaging, developmentally appropriate, and structured activities. The findings of this study are expected to contribute to the development of effective learning strategies in early childhood education, particularly in optimizing visual–motor coordination through play-based approaches.

RESEARCH METHODOLOGY

Research Design

This study employed a Classroom Action Research (CAR) design aimed at improving the quality of the learning process and enhancing children's eye–hand coordination skills. Classroom Action Research is a reflective and cyclical process conducted collaboratively by teachers and researchers to solve classroom problems and improve learning outcomes. This study adopted the Kemmis and McTaggart model, which consists of four stages: planning, action, observation, and reflection. The research was carried out in two cycles, with each cycle consisting of three meetings to ensure iterative improvement.

Research Participants and Setting

The study was conducted in Ibnu Hazar *Raudhatul Athfal*, Jakarta involving children aged 4–5 years. The participants consisted of 18 children, including 10 boys and 8 girls. The study was based on several identified problems, including low eye–hand coordination, limited finger strength, lack of optimal stimulation during learning activities, and the use of less engaging instructional media dominated by worksheets.

Research Procedure

The research procedure followed the CAR cycle model. In the planning stage, learning activities using clamp media were designed. In the action stage, sensorimotor play activities were implemented in the classroom. The observation stage involved recording children's performance and engagement during the activities. Finally, reflection was conducted to evaluate the effectiveness of the intervention and to plan improvements for the next cycle.

Data Collection Techniques

Data were collected through observation, documentation, and performance-based assessment. Observations were conducted to monitor children's participation and development during activities. Documentation supported the findings through visual and written records. Performance assessment was used to evaluate children's eye–hand coordination based on specific indicators.

Data Analysis Techniques

The data were analyzed using descriptive qualitative and quantitative approaches (Hardiyanti & Sakti, 2023). The analysis focused on identifying improvements in children's eye–hand coordination across cycles. The percentage of achievement was calculated using the following formula: $NP=R/SM\times 100\%$

Description:

NP = Percentage score

R = Raw score obtained

SM = Maximum score

The criteria for success were categorized as follows: 75%–100% (Good), 55%–75% (Sufficient), and 40%–55% (Poor).

Indicators of Eye-Hand Coordination

Table 1. Indicators of Eye-Hand Coordination Skills

No	Indicator	Description
1	Grasping ability	The child is able to hold the clamp using thumb and fingers correctly
2	Finger strength	The child shows sufficient strength to press and release the clamp
3	Movement accuracy	The child is able to place objects in the correct position
4	Eye-hand coordination	The child is able to coordinate visual input with hand movement
5	Task control	The child performs activities in a controlled and focused manner

Ethical Considerations

This study adhered to ethical standards in conducting research involving young children. Permission was obtained from the school authorities prior to the study. Informed consent was also secured from parents or guardians of the participating children. The confidentiality of participants was maintained by anonymizing all personal data. Furthermore, all learning activities were designed to be safe, developmentally appropriate, and non-harmful, ensuring that children's well-being remained the top priority throughout the research process.

RESULTS AND DISCUSSION

Results

This research is a type of classroom action research carried out at RA Ibnu Hazar. The subjects of this study consisted of 18 students aged 4-5 years. This research process is carried out in 4 stages, namely: 1). Planning stage, in this stage the researcher prepares the RPPH. 2). Implementation, the researcher takes actions based on the RPPH that has been made. 3). The observation stage is carried out by filling out an observation sheet regarding teacher activities and children's activities when participating in role playing activities, 4). The reflection stage, evaluating the results of the child's ability to participate in sensorimotor play activities with clothespin media.

Pre-Cycle

Before the research was carried out, the researcher made observations by observing the learning process with the aim of finding out the students' eye and hand coordination ability with clamping activities. This activity began with opening activities such as marching, praying, singing, ice breaking. Then the activity of providing material with activity sheets. At this pre-cycle stage, it was found that the results obtained at the time of the activity were that the eye and hand coordination skills of children aged 4-5 years were not yet developed (BB). Children still need improvements and changes in the use of methods and media.

Cycle I

Based on the data above, it can be seen that there are still many children who are not complete in the ability to coordinate eyes and hands. The criteria in the pre-cycle are

Incomplete, because the average score of 54.86% has not been categorized as good. After knowing the results, the researcher rearranged the planning for the next action in Cycle I. Previously, the researcher prepared a learning RPPH or teaching module that had been consulted with the purpose class teacher so that it could adjust to the theme and activities of that day. In this action, the researcher used the sensorimotor play method, clamping media, the research was carried out on Tuesday-Thursday, January 20-22, 2026.

Cycle II

The acquisition of the above data in the first cycle shows that there are still many children who have not completed the ability to use eye and hand coordination. The criteria in the pre-cycle are Incomplete, although the results of the second cycle have increased with an average score of 71.18%, but the category is still incomplete because it is still below 75%. After learning from these results, the researcher rearranged the planning for the next action in Cycle II. Previously, the researcher prepared a learning RPPH using the sensorimotor play method, a clamping medium that will be used in the next study.

The results above show that the ability to coordinate eyes and hands with the sensorimotor playing method using the media of clothespins in RA Ibnu Hazar achieved a success rate with a value of 98.26% categorized as complete. This shows the success of the learning methods applied during the research. Children show excellent abilities in various activities that demand eye and hand coordination, such as pinning number cards, drawing cards, and picking up objects. Thus, the use of the sensorimotor play method with clamp media in developing eye and hand coordination in RA Ibn Hazar can be considered very effective.

From the results of the graph above, it can be concluded that the classroom action research carried out at RA Ibnu Hazar on children aged 4-5 years shows that the use of the sensorimotor play method with clothespin media is able to improve the ability to use eye and hand coordination in solving children's problems in each given activity. This is evident from the gradual increase in this ability, namely at the pre-cycle stage by 54.86%. The results were obtained after the researcher made initial observations, while carrying out activities using the media in the classroom.

At the time of the research in the first cycle, the implementation of learning activities used the sensorimotor play method using clamping media. This clamp media has many colors and types so that children are enthusiastic in doing activities to train their eye and hand coordination skills. The use of the sensorimotor play method with clamping media in cycle I showed an increase in achievement with a result of 71.18%. However, this value has not been completed, and still needs further improvement.

The actions in cycle II showed a greatly improved result, which was 98.26% when compared to pre-cycle and cycle I. The results showed that the research was stopped because the achievement of success was very optimal. The increase occurred due to improvements from the obstacles experienced previously. The use of the sensorimotor play method with clothespin media helps children in eye and hand coordination skills. Children are able to coordinate eye and hand movements when pinching objects, children are able to focus when pinching objects with clothespins, children are able to pick up objects with clothespins using

fingers, and children are able to involve manipulation activities in completing activities. This development achieved the target of success.

The results of this classroom action research were obtained through three stages: pre-cycle, Cycle I, and Cycle II. The improvement in children's eye-hand coordination skills was measured using percentage scores based on observation indicators.

Table 1. Improvement of Eye-Hand Coordination Skills

Stage	Average Score (%)	Category
Pre-Cycle	54.86%	Not Achieved
Cycle I	71.18%	Not Achieved
Cycle II	98.26%	Achieved

The data in Table 1 show a consistent improvement in children's eye-hand coordination skills across each cycle. In the pre-cycle stage, children's abilities were still low, indicating that existing learning methods had not optimally stimulated coordination skills. In Cycle I, there was a noticeable increase; however, the results had not yet reached the success criteria. A significant improvement occurred in Cycle II, where the score reached 98.26%, indicating that most children had achieved optimal development.

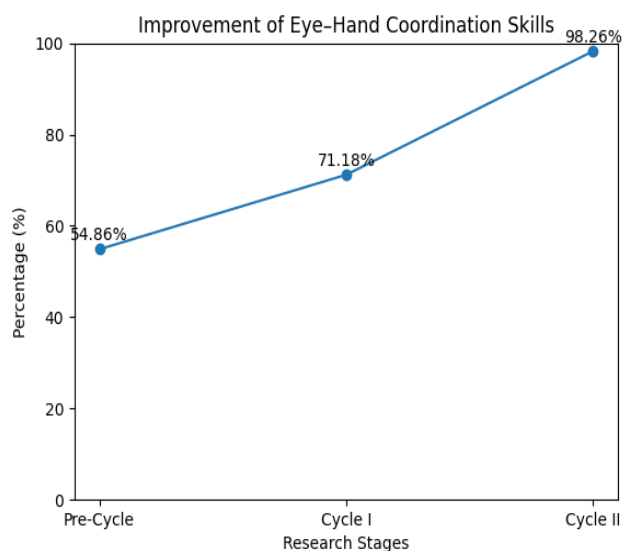


Figure 1. Graph Description

The trend of improvement can be visualized as a steadily increasing line graph: 1) The pre-cycle starts at a low point (54.86%), 2) Cycle I shows a moderate increase (71.18%), 3) Cycle II shows a sharp rise (98.26%) Overall, the learning process at RA Ibnu Hazar has gone smoothly. However, in developing the eye and hand coordination skills of children aged 4-5 years, teachers have not fully maximized the learning methods and media used, so they do not attract attention to children. Therefore, the researcher uses the sensorimotor play method by using clothespins, because the media is a means of distributing messages from the informant to the recipient to stimulate thoughts, attention, and interest so that the learning process occurs through the sensorimotor play method with clothespins with various activities, children feel interested in completing each existing task which can further have an impact on improving eye and hand coordination skills.

Discussion

The findings of this study indicate that sensorimotor play using clothespin media is effective in improving children’s eye–hand coordination skills. The significant increase from the pre-cycle to Cycle II demonstrates that appropriate stimulation through play-based activities can enhance fine motor development in early childhood. This aligns with the view that early childhood learning should emphasize active engagement and direct experience to support developmental outcomes (Daulay & Fauziddin, 2023).

The improvement observed in this study is closely related to the principles of sensorimotor learning, which integrate sensory input and motor responses. According to Craighero, (2022), sensorimotor activities stimulate coordination between visual perception and physical movement, enabling children to develop control and precision. In this study, activities such as pinching, transferring, and manipulating objects required children to synchronize their visual and motor skills, thereby strengthening coordination.

Furthermore, the use of clothespin media contributed significantly to enhancing children’s fine motor skills. As noted by Evivani & Oktaria, (2020), manipulative tools that involve finger movements can strengthen hand muscles and improve coordination. The repetitive use of clothespins in this study allowed children to practice controlled movements, which gradually improved their ability to perform tasks independently and accurately.

The findings also support the importance of play-based learning in early childhood education. Play provides opportunities for children to explore, experiment, and learn in a meaningful way (Babich, 2014; Vygotsky, 1978). In this study, the use of colorful and varied media increased children’s interest and motivation, leading to higher engagement during learning activities. This confirms that enjoyable learning environments play a crucial role in optimizing children’s development.

In addition, the gradual improvement across cycles reflects the effectiveness of iterative learning processes in Classroom Action Research. The refinement of teaching strategies and media in each cycle contributed to better learning outcomes. This is consistent with the concept that continuous reflection and improvement are essential for enhancing instructional effectiveness and supporting children’s developmental needs (Hidayah & Rocmah, 2024).

This study contributes to the field of early childhood education by providing empirical evidence on the effectiveness of sensorimotor play using simple and accessible media, such as clothespins, in enhancing eye–hand coordination skills. It also enriches the practical implementation of Classroom Action Research by demonstrating how iterative cycles can systematically improve children’s developmental outcomes. Furthermore, this study highlights the integration of play-based learning and sensorimotor stimulation as an effective strategy for strengthening fine motor skills in early childhood.

This study has several limitations that should be considered. First, the research was conducted on a small sample within a single classroom setting, which may limit the generalizability of the findings. Second, the duration of the intervention was relatively short, focusing only on two cycles, which may not fully capture long-term developmental changes. Third, the study primarily relied on observational data, which may be subject to researcher bias despite efforts to ensure objectivity.

Future research is recommended to involve a larger and more diverse sample to enhance the generalizability of the findings. Longitudinal studies are also needed to examine the long-term impact of sensorimotor play on children's development. In addition, further studies could explore the use of various types of manipulative media to compare their effectiveness in improving eye-hand coordination. For practitioners, it is suggested that teachers incorporate more innovative, play-based, and sensorimotor-oriented activities into daily learning to optimally support children's fine motor development.

CONCLUSION

Based on the results of research conducted at RA Ibnu Hazar on children aged 4-5 years starting from pre-cycle to cycle II, it can be concluded that the use of sensorimotor play methods using clothespin media can improve eye and hand coordination skills. Stimulation of activities that focus on eye and hand coordination and finger muscles through sensorimotor play using clothespins, children can also exercise their patience. The implications of using this media are very significant, based on the findings of the research that has been described. In order for children's eye and hand coordination skills to develop optimally, it is recommended that teachers be more creative and always innovate in stimulating the child's abilities.

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