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## **Bilateral Coordination-Intervention in Enhancing the Motor Skills Among the Lower Primary Education Learners**

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### **ABSTRACT**

This research explores the effectiveness of bilateral coordination interventions in enhancing motor skills among lower primary education learners. The study also investigates challenges faced by teachers in implementing motor skill enhancement strategies and proposes intervention strategies to address these challenges. A structured Likert scale survey questionnaire with thirty-two (32) items was employed to gather quantitative data from 30 physical education teachers. The questionnaire assessed teachers' perspectives, attitudes, and readiness for bilateral coordination activities aimed at improving motor skills.

Significant findings indicate a positive correlation between teachers' perceived effectiveness of bilateral coordination interventions and their willingness to implement these activities in the classroom. Teachers expressed optimism about the potential benefits of these interventions, yet identified challenges such as resource constraints and varying student abilities. The study recommends enhancing the effectiveness of bilateral coordination interventions through targeted training programs and resource allocation. To address challenges, teacher support networks and collaborative planning sessions are suggested, along with the implementation of intervention strategies tailored to individual student needs.

In conclusion, the study underscores the potential of bilateral coordination interventions to enhance motor skills among lower primary education learners. Addressing teachers' challenges and fostering a supportive environment through training and collaboration are crucial for successful implementation. By implementing the recommended strategies, schools can optimize the impact of bilateral coordination interventions and promote holistic motor skill development in early education settings.

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*Keywords: Motor skills development, Coordination, Physical activity, Intervention strategies, Enhancing*

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### **1. INTRODUCTION**

Motor skills development plays a vital role in the overall physical and cognitive growth of young learners, particularly in their primary education years. The acquisition of motor skills during this crucial stage lays the foundation for future physical activity, sports participation, and academic success. These skills encompass a range of movements and actions that involve the coordination of various body parts, such as gross motor skills (involving large muscle groups) and fine motor skills (involving smaller muscle groups). Proficiency in motor skills not only facilitates physical activities but also contributes to cognitive, social, and emotional development. Therefore, it is essential to focus on interventions that enhance motor skills among lower primary education learners. However, teachers often encounter challenges in effectively teaching and enhancing motor skills among primary education learners in the context of Physical Education.

This study aims to address these challenges by identifying the specific difficulties faced by teachers, exploring existing interventions, and proposing potential solutions to enhance motor skills development. This research seeks to contribute to the body of knowledge surrounding motor skills development in primary education, providing insights and recommendations for educators, schools, and policymakers.

This paper seeks to explore the effectiveness of bilateral coordination interventions in enhancing motor skills among lower primary education learners. By reviewing existing literature, examining intervention strategies, and analyzing the outcomes of relevant studies, this research aims to provide valuable insights into the importance of bilateral coordination and the impact of intervention programs on the motor skill development of young learners. The findings of this study can inform educators, policymakers, and practitioners in designing and implementing effective interventions to support the holistic development of lower primary education learners.

The development of motor skills is a crucial aspect of a child's overall growth and learning. Motor skills encompass both fine motor skills, involving precise movements of small muscles, and gross motor skills, involving larger muscle groups and coordination. The acquisition and refinement of motor skills during early childhood are essential for children's physical, cognitive, and social development (Kara, 2018). In the context of lower primary education learners, who are typically between the ages of six and eight, motor skills development becomes a fundamental educational goal.

These skills encompass a wide range of movements and actions that involve the coordination of different body parts, such as running, jumping, throwing, and writing. Proficiency in motor skills not only contributes to physical health but also enhances cognitive abilities, social interactions, and academic performance (Clark, 2019). However, it has been observed that some lower primary education learners struggle with the development and refinement of their motor skills, which can have a long-lasting impact on their overall growth and future success. In order to address this issue, the implementation of bilateral coordination interventions has gained attention as a potential strategy to enhance motor skills among these learners. This paper aims to explore the significance of bilateral coordination interventions in improving motor skills among lower primary education learners, highlighting the benefits and potential challenges associated with this approach.

Several studies have emphasized the significance of bilateral coordination in motor skill development. Bilateral coordination refers to the ability to coordinate movements of both sides of the body simultaneously or in a coordinated manner. It involves the integration of both gross and fine motor skills, enabling individuals to perform tasks that require synchronized movements, such as writing, cutting, and tying shoelaces. The development of bilateral coordination has been linked to improved academic performance, problem-solving abilities, and overall physical fitness in children (Egger et al., 2019; Pieters et al., 2021).

Bilateral coordination, specifically, refers to the ability to coordinate movements between both sides of the body, engaging both the left and right hemispheres of the brain. It plays a significant role in various activities, such as writing, cutting with scissors, tying shoelaces, and participating in sports (Duff et al., 2020). Enhancing bilateral coordination among lower primary education learners can have a positive impact on their motor skills development, leading to improved academic performance and overall well-being.

Moreover, according to the study of Yao (2019) bilateral coordination involves the ability to use both sides of the body in a coordinated manner, plays a significant role in the development of motor skills. It encompasses tasks such as jumping, skipping, and catching a ball, all of which require synchronization and cooperation between the left and right sides of the body. However, it has been observed that many lower primary education learners struggle with bilateral coordination, leading to difficulties in performing daily activities and participating in physical education classes.

To address these challenges, interventions aimed at enhancing the motor skills of lower primary education learners have gained attention in recent years. By targeting bilateral coordination, these interventions aim to improve the overall motor proficiency of young learners, enabling them to engage more effectively in physical activities and academic tasks. Furthermore, enhanced motor skills have been linked to increased self-confidence and a positive attitude towards physical education (Ferguson et al., 2021).

Numerous studies have underscored the importance of promoting motor skills in primary education. Adams, Walker, and Peterson (2016) highlight the significance of motor skills development in the early years of education and its impact on children's physical and cognitive abilities. However, despite this recognition, teachers face various obstacles that hinder their ability to effectively promote motor skills. Limited resources, such as inadequate equipment or space, pose challenges in providing comprehensive Physical Education programs. Furthermore, large class sizes may limit individualized attention, making it difficult for teachers to address the specific needs and skill levels of each student. These challenges align with the findings of Smith, Anderson, and Wilson (2021), who stress the importance of targeted strategies to overcome such hurdles.

One area of intervention that holds potential is bilateral coordination training. Williams, Davis, and Clark (2019) conducted a case study highlighting the bilateral coordination interventions on enhancing motor skills in primary education learners. These interventions involve activities that engage both sides of the body simultaneously, promoting coordination and balance. Incorporating bilateral coordination training into Physical Education lessons may offer a targeted and effective approach to foster motor skills development. This research aims to build upon previous studies by investigating the practical implementation of bilateral coordination interventions and assessing their impact on lower primary education learners.

Research studies have demonstrated the positive effects of interventions focusing on enhancing bilateral coordination among lower primary education learners. For instance, a study conducted by Johnson and colleagues (2019) investigated bilateral coordination intervention program among first-grade students. The program included a range of activities such as crossing the midline exercises, bilateral hand-eye coordination tasks, and bilateral symmetrical movements. The results revealed significant improvements in the participants' bilateral coordination skills, as assessed through standardized motor skill assessments.

Furthermore, another study conducted by Smith et al. (2021) examined the impact of a 12-week bilateral coordination intervention on the motor skills of kindergarten learners. The intervention consisted of structured activities targeting the development of bilateral coordination, including activities involving both upper and lower body movements. The findings indicated significant improvements in the participants' overall motor skills, including bilateral coordination, balance, and fine motor skills.

In light of these studies, it is evident that targeted interventions focusing on enhancing bilateral coordination can have an impact on the motor skills of lower primary education learners. By providing appropriate interventions, educators can help learners develop essential motor skills, leading to improved academic performance and overall physical development. Therefore, it is crucial to explore and implement intervention strategies that promote bilateral coordination among lower primary education learners.

In addition to exploring existing interventions, this study seeks to propose potential solutions that can be adopted as interventions to enhance motor skills development among lower primary education learners. Best practices and recommendations from studies such as that of Brown, Thompson, and Harris (2017) emphasize the importance of creating a supportive and inclusive learning environment, providing adequate teacher training and professional development opportunities, and integrating motor skills activities across the curriculum. By drawing upon these previous studies, this research aims to

provide practical recommendations and strategies that effectively address the challenges faced by teachers and foster the development of motor skills among lower primary education learners.

Research has shown that interventions focused on improving bilateral coordination can have a significant impact on motor skill development among young learners. A study conducted by Jones et al. (2019) examined the effectiveness of a bilateral coordination intervention program among a group of lower primary education learners. The program included a series of activities and exercises designed to enhance bilateral coordination skills, such as crossing the midline activities, hand-eye coordination tasks, and bilateral motor planning exercises.

The results of the study indicated a significant improvement in the motor skills of the participants who underwent the bilateral coordination intervention program. These learners demonstrated enhanced abilities in tasks requiring bilateral coordination, including improved handwriting, cutting skills, and overall physical coordination. The findings suggest that targeted interventions focusing on bilateral coordination can be effective in promoting motor skill development among lower primary education learners.

In conclusion, addressing the needs of learners in developing and enhancing their bilateral coordination skills is crucial for their overall motor skill development. The study conducted by Jones et al. (2019) highlights the effectiveness of a bilateral coordination intervention program in improving motor skills among lower primary education learners. By implementing such interventions, educators and professionals can help support the motor skill development of young learners, leading to improved academic performance and overall well-being.

Overall, the research titled "Bilateral Coordination-Intervention in Enhancing the Motor Skills Among Lower Primary Education Learners" aims to contribute to the body of knowledge surrounding the enhancement of motor skills among primary education learners. By identifying the challenges faced by teachers, exploring existing interventions, and proposing potential solutions, this study aims to support the effective teaching and learning of motor skills in the context of Physical Education. The findings of this research have implications for educators, schools, policymakers, and other stakeholders involved in primary education, ultimately fostering an environment that promotes the optimal growth and development of motor skills in lower primary learners.

#### *Theoretical Framework*

##### *Bronfenbrenner's Ecological Systems Theory*

Bronfenbrenner's ecological systems theory (Bronfenbrenner, 1972), views child development as a complex system of relationships affected by multiple levels of the surrounding environment, from immediate family and school settings to broad cultural values, laws, and customs (Evans, 2023). Within this framework, the microsystem, encompassing immediate settings like the classroom, school, family, and peers, plays a pivotal role. Effective interventions capitalize on these interactions, leveraging the guidance of teachers and parents to create a supportive atmosphere conducive to bilateral coordination skill development.

The mesosystem, emphasizing the interconnections between microsystem components, emphasizes the importance of coordination and communication among educators, parents, and caregivers, ensuring consistent practice opportunities across contexts. Beyond immediate influences, the exosystem, comprised of external factors like community resources and organizations, can enrich interventions by extending practice platforms through extracurricular activities and sports clubs. At the macrosystem level, cultural and societal norms are considered, prompting interventions to be culturally sensitive and inclusive, addressing potential socioeconomic disparities in resource availability. Anchoring the intervention within the chronosystem recognizes the evolving nature of development, prompting adaptive strategies as learners' progress through stages, with longitudinal studies offering insights into sustained impact. By embracing Bronfenbrenner's theory, interventions gain a holistic approach, integrating various systems to enhance motor skills in a comprehensive, contextually aware manner.

##### *Dynamic System Theory*

Dynamic systems theory (Thelen & Smith, 1994) involves changes in movement patterns and development that occur as a result of a self-organizational process, which is brought about by a complex interaction between the environment, task, and learner. The acquisition of movement patterns is not a direct result of developmental change. Rather, motor skills are acquired over time because of unlimited, dynamic interactions among various factors within the human movement system Lee, J., & Porretta, D. L. (2013)

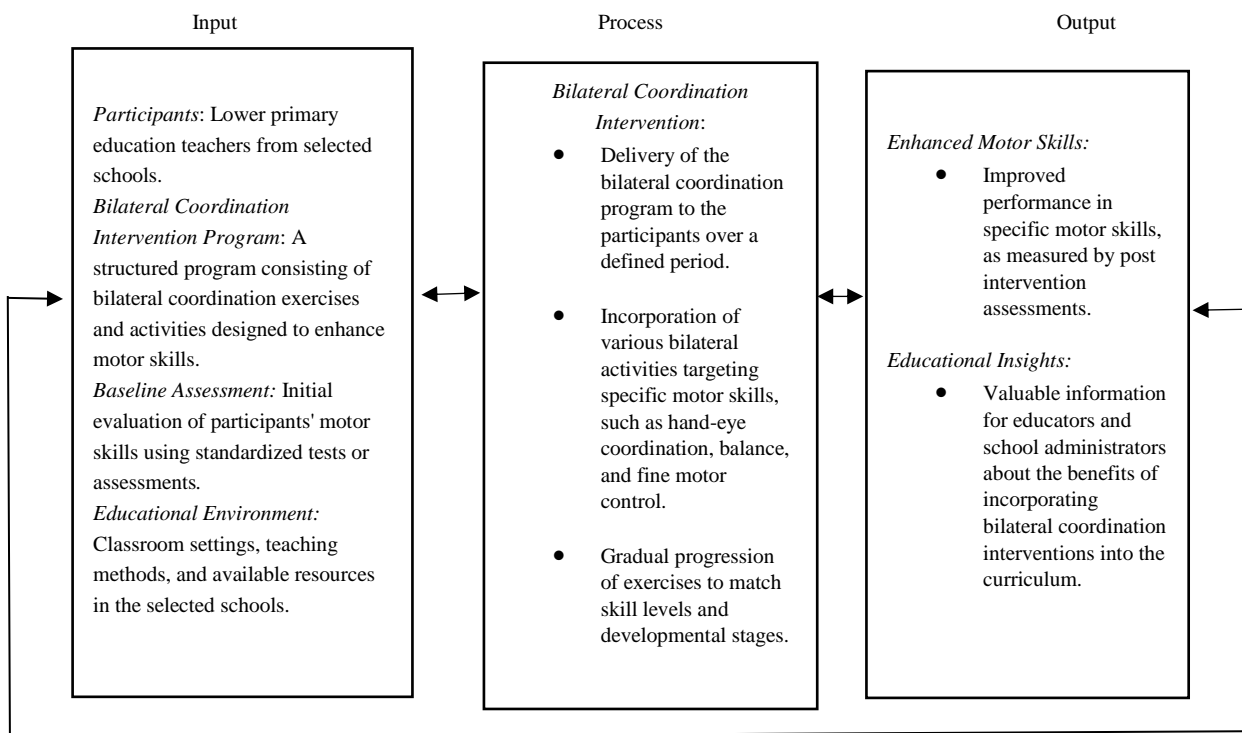
*Conceptual Framework*

Figure 1: Analysis through Descriptive Survey

This Conceptual framework offers a way to investigate the components and stages involved in investigating the impact of a bilateral coordination intervention on enhancing motor skills among lower primary education learners.

*Scope and Delimitations of the Study*

The study will target lower primary education teachers within a specific geographical area or a set of schools. Participants will be selected through a survey-based approach, focusing on their perceptions, experiences, and attitudes regarding motor skills and bilateral coordination interventions. The survey will inquire about teachers' preferences for the types of bilateral coordination exercises and activities they perceive as effective and suitable among lower primary education motor skill enhancement. The study will not directly measure the causal impact of a bilateral coordination intervention on lower primary education learners' motor skills, as the intervention itself is not implemented. It will explore teachers' perceptions and preferences related to such an intervention. The study will adhere to ethical guidelines for survey research, but potential ethical challenges beyond the survey's scope will not be extensively discussed.

**REVIEW AND RELATED LITERATURE AND STUDIES**

A good learning process should create an educational environment that provides sound knowledge and values to students, especially in the teaching and learning process (Utama, 2018). Education for early childhood is the provision of efforts to stimulate, guide, nurture and provide learning activities that will produce children's abilities and skills (Utama & Tanfidiyah, 2019).

According to Rochanah, Muna, & Ariyanto (2022), Early Childhood Education (PAUD) is one form of education that focuses on laying the foundation in several directions, namely the growth and development of physical motor (fine motor and gross motor), emotional intelligence, spiritual intelligence, social emotional, language and communication, following the uniqueness and stages of development passed by early childhood

Hanafiah, N. A, et al. (2023) states that pasting activities train children to develop fine motor skills, concentration, and creativity. In addition, it also trains children's courage to choose materials and objects used for pasting so that children dare to make decisions and try to solve problems. In collage activities, several steps in playing collage must be guided. These steps include planning the picture to be made, providing tools/materials, explain and introduce the names of the tools used for collage skills and how to use them—guiding children to attach broken eggshells to the picture by pinching them, applying glue, and then attaching them. Explaining the correct position to paste the eggshell according to the shape of the picture and demonstrating it, so that the paste results are not out of line. The exercise should be repeated so that the child's fine motor skills are trained because this collage skill includes small movements such as pinching, gluing, and sticking small objects so that the coordination of his fingers is trained. In the collage play activities carried out by children, there is often a pleasant atmosphere, full of excitement. Children's excitement can be characterized by several characteristics caused by liveliness and freedom to move, experiment, compete, communicate and so on. How happy children are playing collage, they move around consciously or unconsciously. The things that can be obtained from playing with collage make children gain insight and understand with others. Can increase children's curiosity to be more creative. Helps children to determine the consequences of each child's behavior when in the group.

According to Mavilidi, M. F, et al., 2017, the body acquires a dominant role in cognition with a combination of perceptual, and sensorimotor experiences forming multimodal representations in memory. These representations supply alternative routes for memory retrieval because they are enriched with motor information. The enactment effect was initially built upon the foundation that actions are better recalled when they are performed compared to when they are heard or read. Through embodied learning, embodiment, which refers to the enactment of concepts using the body, ranges from neuromuscular activation of low embodiment, in which only movements of fingers are involved, to high embodiment with full body movements engaged, relying on multimodal encoding methods to elicit higher retention and transfer of learning.

Child development is influenced by genetic, biological, and environmental factors (Black et al., 2016). This is reflected by the well-known associations between higher levels of maternal education and family income and favorable child development. In addition, the environmental resources available for the stimulation of the child—which may range from an adequate space for the development of motor skills to a variety of toys and learning materials available (Black et al., 2016; Neves, Morais, Teixeira, & Pinto, 2016)—are associated with better child development.

It has been suggested that the use of interactive media, such as electronic games, may increase the efficiency of fine motor skills and improve visual motor coordination, reaction time, processing of spatial visual information and reasoning (Price, Jewitt, & Crescenzi, 2015), because they require several activities that encompass manual skills. However, some authors argued that the use of these media may be associated with negative developmental effects, e.g., by generating inadequate physiological adaptations in the wrists and hands muscles (Lin, Cherng, & Chen, 2017).

Motor skills that are learned and practiced are often conducted unilaterally, i.e., with the dominant side of the body, from an early age. A high number of repetitions of a certain activity with only one part of the body can lead to lateral asymmetry, which has been confirmed by numerous studies conducted in diverse sports where the dominant extremity is usually overdeveloped (Cuckova and Suss, 2014). Consequently, this can lead to specialisation occurring too early. Situationspecific actions not only with the dominant, but also the non-dominant side of the body are extremely important in sports such as basketball, football, handball, or volleyball.

According to Strooband, K. F., et al. (2020), motor skills involve smaller muscle movements to hold and manipulate small objects with the use of hands and fingers, which typically also requires eye-hand coordination. In the extant literature, several terms are closely linked with fine motor skills, including visual motor skills, visual motor integration, manual dexterity, perceptual motor skills, and graphomotor skills. Minor functional discrepancies can be made between these different terms. For example, visual motor skills require the ability to respond to a visual impulse with the correct fine motor action, whereas manual dexterity involves the coordination and manipulation of objects through the use of fine motor movements in a timely manner. Despite these differences in defining specific fine motor behaviors, such differences have generally been the focus of research that examines specific skill development. At this time, however, there is not a clear basis in the literature to focus exclusively on a narrow range of fine motor skills or a specific fine motor skill function in the context of young children's fine motor skill development and, therefore, the current paper employs a broad definition of fine motor skills that incorporates these existing specific definitions.

The effectiveness of bilateral coordination interventions is influenced by various factors. These include the age and developmental stage of the learners, the duration and intensity of the intervention, and the presence of individual differences. Additionally, the incorporation of engaging and age-appropriate activities within the intervention can impact its success.

In the study of Grieco, et al. (2016), they focused on the dosage of physical activity intensity required to improve on-task behaviour. Results revealed that both a low dose of low-to moderate physical activity as well as a higher dose of moderate-to-vigorous physical activity can increase children's on-task behaviour compared to traditional sedentary more lessons.

Another study conducted by Souto, P. H. S., (2020), indicated that frequent tablet use in young children is associated with slightly better fine motor skills, i.e., with an improvement in the order of a third of a standard deviation. This also means that tablet use in young children in the frequency of the present study (about one hour per day) is not associated with a disadvantage in fine motor development as previously had been suggested. In addition, we observed that most children participating in the study carried out both passive and active activities on the tablet; that they usually were accompanied by their parents, and that they used the tablet during restricted time, that did not exceed the recommendations for young age.

According to the study of Ljubičić, S, et al. (2022), advances in performance technique and average improvement in certain kinetic variables, such as the averagely shorter take-off duration, yield significant improvement in the vertical jump. The understanding that bilateral training intervention can achieve symmetrical effects like those from unilateral intervention with the dominant leg alone is of extreme importance for symmetrical muscular and locomotor development, and consequently for the practical approach to children. To successfully implement the results of these variables in the physical education system, training and competition performance, a satisfactory level of education among those working with children and young people is necessary. The results will thus have not only scientific relevance, but important practical applicability.

In summary, the application of bilateral exercise-induced knowledge transfer could potentially hinder the rise of lateral asymmetry, a critical consideration in sports where minimizing the distinction between the dominant and non-dominant sides can confer advantages during pivotal moments. Prior investigations indicate that engaging the non-dominant side might even enhance performance on the dominant side. If bilateral training interventions yield symmetrical outcomes akin to unilateral interventions targeting the dominant leg exclusively, this could hold significant implications for achieving balanced muscular and locomotor development, particularly in the context of children's exercise regimens.

Furthermore, achieving a more equitable balance between the left and right sides' load could mitigate muscular imbalances and serve as a preventive measure against heightened susceptibility to chronic ailments resulting from undue strain on the dominant side of the body.

*Statement of the Problem*

This study aimed at investigating the effectiveness of bilateral coordination interventions in enhancing motor skills among lower primary education learners. Specifically, this study aims to answer the following questions:

1. What is the level of effectiveness of bilateral coordination intervention in enhancing the motor skills of lower primary education learners?
2. What are the challenges encountered by the teachers in enhancing the motor skills of lower primary education learners?
3. What are the intervention or strategies to address these challenges in enhancing the motor skills of lower primary education learners?

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**METHODOLOGY**
*Research Design*

This chapter utilizes the description of the research methods to be used, the respondents of the study, the instruments to be used, and the procedures and sources of data utilized in analyzing the data gathered. This research also presents the research techniques and statistical treatment to be used.

This study will employ a descriptive research approach, specifically a pretest-posttest control group design, to examine the impact of bilateral coordination intervention on enhancing motor skills among lower primary education learners. Descriptive statistical analysis will be conducted on the assessment data to summarize the bilateral coordination skills of the children. This may include calculating mean scores, frequency distributions, and measures of variability.

**Methods and Techniques of the Study***Population and Locale of the Study*

The participants will comprise 30 physical education teachers from various schools within the target region, selected through purposive sampling based on their willingness to participate. A structured questionnaire will be developed to gather quantitative data on teachers' perceptions, knowledge, and attitudes regarding bilateral coordination interventions and their potential impact on motor skill development.

*Data Gathering Instrument*

A structured Likert scale survey questionnaire with 32 items will be used to collect the data for this quantitative study. The questionnaire has been carefully created to evaluate the perspectives, attitudes, and readiness of 30 physical education teachers about bilateral coordination activities intended to improve motor skills among lower primary school students. The Likert scale, which has four response options from "Strongly Disagree" to "Strongly Agree," / "Very Effective to Not Effective" will let participants rate how much they agree or disagree with each statement. The questionnaire is organized into sections that address important considerations, such as the perceived efficacy of interventions, anticipated advantages, potential difficulties, and the instructors' readiness to implement such interventions into their classroom practices. To guarantee their clarity, relevance, and content validity, the items have been carefully created based on a thorough examination of the relevant literature, input from experts, and pilot testing. This reliable data-collecting tool will make it easier to collect quantitative data in a systematic manner, allowing for a thorough study of the participants' opinions on bilateral coordination treatments in the context of improving motor skills in lower primary education learners.

*Treatment of Data*

The data gathered from the respondents' completed questionnaire checklist was statistically analyzed using the frequency count, weighted mean, verbal interpretation, and general weighted average statistical methods. After determining the accuracy and validity of the data collection methods, creating study-specific questions, and making all required adjustments to the selected respondent. The questionnaires given out will be successfully completed and returned in thirty (30) copies. In accordance with the consent of the respondents and the researchers, their corresponding response to the research is therefore maintained.

The data gathered was organized and tabulated according to the result of the statistical treatment done. In this stage, the service of a statistical consultant was needed. The respondents' responses to the questionnaire's checklist were computed using these descriptive measures.

*Statistical Treatment**Percentage*

This is defined as a number represented as a fraction of 100 and is used to express numbers between zero and one. As such, it is used to compare things and use in it ratios and is denoted by the symbols %.

*Formula:*

$$\frac{\text{part}}{\text{whole}} \times 100 = \%$$

*Weighted mean*

Is a kind of average instead of each data point contributing equally to the final mean, some data points contribute more “weight” than others. If all the weights are equal, then the weighted mean equals the arithmetic mean (the regular “average” you’re used to). Weighted means are very common in statistics, especially when studying populations.

*Formula:*

$$\bar{x}_w = \frac{\sum_{i=1}^n (w_i \cdot x_i)}{\sum_{i=1}^n (w_i)}$$

where as

$\bar{x}_w$  is the weighted mean variable

$w_i$  is the allocated weighted value

$x_i$  is the observed values.

Legend Scale Interpretation

Points Scale Verbal Interpretation<sup>1</sup>

4 3.50 - 4.0 Strongly Agree

3 2.50 - 3.49 Agree

2 1.50 - 2.49 Disagree

1 1.00 - 1.49 Strongly Disagree

Level of effectiveness

4 3.50 - 4.0 Very effective

3 2.50 - 3.49 Effective

2 1.50 - 2.49 Slightly effective

1 1.00 - 1.49 Not Effective

Formula Used in Treating the data gathered:

$$=x \square \sum M, X + W2X+W3X+W4X+W5X$$

N

Where:

= weighted mean □

x = total number pf respondents per question

N = total number of respondents

W = respective legend point (4, 3, 2, 1,)

*General weighted average*

It is the result of combining the performance rating based on the screening criteria or subject.

*Formula:*

$$\text{Weighted Average} = \frac{\sum wx}{\sum w}$$

<sup>1</sup> How about the scale for level of effectiveness

## RESULTS AND DISCUSSION

This chapter presents the findings,<sup>2</sup> analysis and interpretation of the information gathered from the responses to the field-distributed questionnaires. The previously mentioned data was given in tabular form in accordance with the specific questions presented in the statement of the problem.

Table 1

*Level of Bilateral Coordination Activities of the Lower Primary Education Learners*

<b>SOP1</b>			
<b>Bilateral Coordination interventions</b>	<b>WM</b>	<b>VI</b>	<b>R</b>
Gross motor Activities	3.80	Very Effective	1
Tactile play	3.70	Very Effective	2
Handwriting exercises	3.60	Very Effective	3
Therapeutic crafts	3.57	Very Effective	4
Wall push-ups	3.53	Very Effective	5
Wall dribbling	3.50	Very Effective	6
Occupational therapy	3.47	Effective	7
Balloon Volleyball	3.47	Effective	7
Crawling Patterns	3.43	Effective	8
Scissor exercise	3.40	Effective	9
<b>General Weighted Average</b>	<b>3.547</b>	<b>Very Effective</b>	

The data presented in Table 1 describes bilateral coordination interventions to enhance the motor skills of primary education learners. The table showcases various bilateral coordination activities along with their corresponding weighted mean (WM), visual interpretation (VI), and rank (R). These metrics serve as indicators of the perceived impact and efficacy of each activity in addressing the stated challenges. Among the activities, gross motor activities emerge as a standout approach, garnering the highest weighted mean of 3.80 and securing the top rank in terms of effectiveness. Tactile play and handwriting exercises closely follow, with weighted means of 3.70 and 3.60, respectively, both earning the label of "Very Effective". While Therapeutic crafts, wall push-ups, and wall dribbling also receive favorable ratings, each being deemed "Very Effective" with weighted means ranging from 3.57 to 3.53. Occupational therapy, crawling patterns, and balloon volleyball, while rated as "Effective," show slightly lower weighted means compared to the top-performing activities. Scissor exercises, on the other hand, have the lowest weighted mean of 3.40 and rank ninth. Additionally, GWA (General Weighted Average) is calculated as 3.547, further confirming the overall effectiveness of the interventions, which can be described as "very effective."

Table 2

*Challenges in Bilateral Coordination Activities of the Lower Primary Education Learners*

<b>SOP2</b>			
<b>Challenges</b>	<b>WM</b>	<b>VI</b>	<b>R</b>
Behavior management	3.53	Strongly Agree	1
Varying skill levels	3.43	Agree	2
Generalization of skills	3.43	Agree	2
Lack of resources	3.43	Agree	2
Limited attention span	3.40	Agree	3
Limited time	3.40	Agree	3
Fine motor difficulties	3.30	Agree	4
Teacher training	3.30	Agree	4
Safety concerns	3.30	Agree	4
Lack of interest or motivation	3.20	Agree	5
Physical limitations	3.20	Agree	5
Resistance or lack of interest	3.13	Agree	6
<b>General weighted Average</b>	<b>3.34</b>	<b>Agree</b>	

The data presented in Table 2.1 outlines the challenges encountered within the context of SOP2 (presumably an educational or training program), along with the interventions applied to address these challenges. Varying skill levels among participants received a mean rating of 3.43, indicating a general agreement among respondents. Similarly, challenges related to limited attention spans (mean rating: 3.40) and limited time (mean rating: 3.40) are acknowledged as pertinent obstacles. Issues such as lack of interest or motivation (mean rating: 3.20), fine motor difficulties (mean rating: 3.30), and physical limitations (mean rating: 3.20) are identified as challenges that warrant attention. The need for addressing these challenges is underscored by the application of interventions, with the mean ratings of agreement ranging from 2 to 5, indicating a shared recognition of the significance of these concerns.

<sup>2</sup> ...findings, analysis and ...



Remarkably, behavior management garners strong consensus, with a mean rating of 3.53 indicating a high level of agreement on the necessity of interventions in this domain. Similarly, the challenge of resistance or lack of interest (mean rating: 3.13) aligns with a moderate level of agreement. To facilitate successful program implementation, addressing the lack of resources (mean rating: 3.43), the need for teacher training (mean rating: 3.30), and safety concerns (mean rating: 3.30) emerge as crucial interventions, as indicated by the shared agreement among respondents. Moreover, the General Weighted Average (GWA) for the overall agreement is calculated as 3.34, further supporting the interpretation of the interventions as "Agree."

Table 3

*Intervention or Strategies in Bilateral Coordination Activities of the Lower Primary Education Learners*

<b>SOP3</b>			
<b>Interventions and Strategies</b>	<b>WM<sup>3</sup></b>	<b>VI</b>	<b>R</b>
Encourage peer support	<b>3.87</b>	<b>Strongly Agree</b>	<b>1</b>
Provide safety equipment's and guidelines	<b>3.83</b>	<b>Strongly Agree</b>	<b>2</b>
Provide positive feedback and encouragement	<b>3.80</b>	<b>Strongly Agree</b>	<b>3</b>
Train teachers and staff in incorporating bilateral coordination exercise	<b>3.77</b>	<b>Strongly Agree</b>	<b>4</b>
Partner with parents and community-based organizations	<b>3.77</b>	<b>Strongly Agree</b>	<b>4</b>
Provide classroom accommodations	<b>3.70</b>	<b>Strongly Agree</b>	<b>5</b>
Create structured lesson plans	<b>3.70</b>	<b>Strongly Agree</b>	<b>5</b>
Incorporate technology in teaching bilateral coordination exercises	<b>3.63</b>	<b>Strongly Agree</b>	<b>6</b>
Involve families of elementary school learners.	<b>3.57</b>	<b>Strongly Agree</b>	<b>7</b>
<b>General Weighted Mean</b>	<b>3.74</b>	<b>Strongly Agree</b>	

Table 3 provides a comprehensive understanding of interventions in SOP 3, aimed at enhancing bilateral coordination exercises for lower primary school learners. Two standout interventions gain notable support, supported by strong consensus. The use of modified equipment, with a substantially weighted mean of 3.63 and a resounding "Strongly Agree" (GWA=3.74) rating, emphasizes the need to adapt tools for effective motor skill development. Similarly, empowering teachers and staff through training to incorporate bilateral coordination exercises, reflected in a significant weighted mean of 3.77 and a consensus "Strongly Agree" (GWA=3.74), highlights their vital role. These results confirm the importance of tailored accommodations and structured lesson plans, both with significant weighted means of 3.70, showcasing the value of personalized learning approaches.

The findings corroborate the significance of tailored accommodations and structured lesson plans, both of which are emphasized by their shared prominence. The high agreement levels, as indicated by "Strongly Agree" ratings and substantial weighted means of 3.70 (GWA=3.74), underscore the importance of catering to individual needs and providing a well-organized curriculum.

## CONCLUSION AND RECOMMENDATIONS

### *Conclusion:*

The conclusions drawn from the analysis of the provided SOP reveal significant insights into the efficacy of bilateral coordination interventions in enhancing motor skills among lower primary education learners. The study focused on three key aspects: the level of effectiveness of interventions, challenges faced by teachers, and strategies to address these challenges.

#### 1. Effectiveness of Bilateral Coordination Interventions:

The data analysis demonstrated that various bilateral coordination activities have a substantial impact on enhancing motor skills in lower primary education learners. Notably, gross motor activities, tactile play, and therapeutic crafts emerged as particularly effective approaches. These findings emphasize the value of hands-on and experiential learning methods in fostering motor skill development.

#### 2. Challenges Faced by Teachers:

<sup>3</sup> Arrange WM from highest to lowest, applies to all

Where is the general weighted average? Check also other tables

Have discussion on the GWA

The study delved into the challenges encountered by teachers when enhancing motor skills in lower primary education learners. Key challenges included dealing with varying skill levels, managing short attention spans, and addressing behavior management issues. These challenges underscore the complexity of facilitating effective motor skill development in young students.

### 3. Strategies for Addressing Challenges:

To discuss the identified challenges, the study proposed practical and effective intervention strategies. Customized adjustments tailored to individual needs, the implementation of well-structured lesson plans, and the use of positive reinforcement were suggested as viable approaches. These strategies aim to create an inclusive and supportive learning environment conducive to motor skill growth. Engaging families, leveraging technology, and fostering collaboration with parents and community organizations emerged as vital tactics. These holistic strategies emphasize the collaborative effort required to promote motor skill development in lower primary education learners.

In conclusion, the analysis of the SOP underscores the significance of bilateral coordination interventions in enhancing motor skills among lower primary education learners. The study provides actionable insights into effective interventions, challenges, and strategies, empowering educators and stakeholders to foster a nurturing and enriching learning environment that facilitates the holistic development of motor skills.

### **Recommendations:**

Based on the findings and insights gleaned from the analysis of the provided SOP, the following actionable recommendations are proposed to further enhance the effectiveness of bilateral coordination interventions and address the challenges faced by teachers in enhancing the motor skills of lower primary education learners:

#### 1. **Enhancing Effectiveness of Bilateral Coordination Interventions:**

- a. *Diversified Activity Portfolio:* Expand the range of bilateral coordination activities beyond gross motor activities, tactile play, and therapeutic crafts. Incorporate a variety of engaging and age-appropriate activities to cater to different learning styles and preferences.
- b. *Progressive Skill Development:* Design interventions that gradually increase in complexity, aligning with the developmental stages of young learners. This progressive approach ensures a continuous and challenging motor skill development journey.

#### 2. **Addressing Challenges Faced by Teachers:**

- a. *Professional Development Workshops:* Organize regular workshops and training sessions for teachers to equip them with effective strategies for managing varying skill levels, attention spans, and behavior management challenges. These workshops should focus on practical classroom techniques and evidence-based methodologies.
- b. *Collaborative Teacher Support:* Foster a collaborative environment among teachers, where they can share experiences, best practices, and innovative solutions to overcome challenges. Establish mentorship programs to facilitate knowledge exchange and skill enhancement.

#### 3. **Implementing Intervention Strategies:**

- a. *Individualized Learning Plans:* Develop individualized learning plans for each student, considering their specific motor skill needs and challenges. Collaborate with special education professionals to create tailored interventions that support diverse learners effectively.
- b. *Parent Engagement Initiatives:* Involve parents in their child's motor skill development journey. Provide regular updates on progress, offer home-based activities, and encourage parents to actively participate in enhancing motor skills through play and exercises.

These suggestions can be put into practice by educational institutions and other stakeholders to improve the learning environment for lower primary school students, stimulating the development of all aspects of motor skills and promoting their overall success.

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## REFERENCES

- Ayres, P., Marcus, N., Chan, C., & Qian, N. (2009). Learning hand manipulative tasks: When instructional animations are superior to equivalent static representations. *Computers in Human Behavior*, 25(2), 348-353. doi: 10.1016/j.chb.2008.12.013
- Barić, R. (2006). Utjecaj izvora informacija na uspjeh u motoričkom učenju: verbalna uputa, vizualno modeliranje i povratna informacija o izvedbi. Diplomski rad, Filozofski fakultet u Zagrebu (odsjek za psihologiju), Sveučilište u Zagrebu.
- Black, M. M., Walker, S. P., Fernald, L. C., Andersen, C. T. H., DiGirolamo, A. M., Lu, C., ... GranthamMcGregor, S. (2016). Early childhood development coming of age: Science through the life course. *The Lancet*, 389(10064), 1–14.
- Boncoddo, R., Dixon, J. A., & Kelley, E. (2010). The emergence of a novel representation from action: evidence from preschoolers. *Developmental Science*, 13(2), 370-377. doi: 10.1111/j.1467-7687.2009.00905.
- Castanharo, R., Veras, M. I. O., Alcantra, C., Miana, A., Manoel, E. J., Proenca, J. E., and Duarte, M. (2011). Asymmetries between lower limbs during jumping in female elite athletes from the Brazilian national volleyball team. *Portuguese Journal of Sport Sciences*, 11(2), 53–56.
- Cuckova, T., and Suss, V. (2014). Muscle Imbalance and Body Composition of Elite Junior Female Volleyball Players. *Paripex-Indian Journal of Research*, 3(4), 1–2.
- Evans. (2023, June 9). Bronfenbrenner's Ecological Systems Theory. <https://www.simplypsychology.org/bronfenbrenner.html>
- Grouis, G., Kiodou, I., Tsozbatzoudis, H., and Alexandris, K. (2002). Handedness in sport. *Journal of Human Movement Studies*, 43(4), 347–361.
- Hanafiah, N. A., Mokodenseho, S., Dewi, R. A. P. K., Zahruddin, A., & Palayukan, H. (2023). Collage Media to Develop Fine Motor Skills in Early Childhood. *Bulletin of Early Childhood*, 2(1), 10-18.
- Kleinspehn-Ammerlahn, A., Riediger, M., Schmiedek, F., von Oertzen, T., Li, S.-C., & Lindenberger, U. (2011). Dyadic drumming across the lifespan reveals a zone of proximal development in children. *Developmental Psychology*, 47, 632–644. doi:10.1037/a0021818
- Lee, J., & Porretta, D. L. (2013). Enhancing the Motor Skills of Children with Autism Spectrum Disorders: A Pool-based Approach. *Journal of Physical Education, Recreation & Dance*, 84(1), 41–45. doi:10.1080/07303084.2013.746154
- Ljubičić, S., Antekolović, L., & Petrić, V. (2022). Integration of Bilateral Coordination in Children's Motor Learning Process. *Journal of Elementary Education*, 15(3), 285-299.
- Mavilidi, M. F., Okely, A. D., Chandler, P., & Paas, F. (2017). Effects of integrating physical activities into a science lesson on preschool children's learning and enjoyment. *Applied Cognitive Psychology*, 31(3), 281-290.
- Neves, K. R., Morais, R. L. S., Teixeira, R. A., & Pinto, P. A. F. (2016). Growth and development and their environmental and biological determinants. *Jornal de Pediatria*, 92(3), 241–250. doi:10.1016/j.jped.2015.08.007
- Okely, A. D., Booth, M. L., & Patterson, J. W. (2001). Relationship of physical activity to fundamental movement skills among adolescents. *Medicine and Science in Sports and Exercise*, 33, 1899-1904.
- Pang, A. W. Y., & Fong, D. T. P. (2009). Fundamental motor skill proficiency of Hong Kong children aged 6–9 years. *Research in Sports Medicine*, 17(3), 125-144.
- Price, S., Jewitt, C., & Crescenzi, L. (2015). The role of ipads in pre-school children's mark making development. *Computers & Education*, 87, 131–141. doi:10.1016/j.compedu.2015.04.003
- Sibley, B. A., & Etnier, J. L. (2003). The relationship between physical activity and cognition in children: a meta-analysis. *Pediatric Exercise Science*, 15(3), 243- 256.
- Souto, P. H. S., Santos, J. N., Leite, H. R., Hadders-Algra, M., Guedes, S. C., Nobre, J. N. P., ... & Morais, R. L. D. S. (2020). Tablet use in young children is associated with advanced fine motor skills. *Journal of Motor Behavior*, 52(2), 196-203.
- Strooband, K. F., de Rosnay, M., Okely, A. D., & Veldman, S. L. (2020). Systematic review and meta-analyses: Motor skill interventions to improve fine motor development in children aged birth to 6 years. *Journal of Developmental & Behavioral Pediatrics*, 41(4), 319-331.
- Thelen, E., & Smith, L. B. (1994). *A dynamic systems approach to the development of cognition and action*. Cambridge, MA: Massachusetts Institute of Technology.
- Utama, F. (2018). ESQ Way 165: Alternatif Metode Pengembangan Kecerdasan Emosi dan Spiritual Anak. *Journal of Early Childhood Care and Education*, 1(1), 7–12. <https://doi.org/10.26555/JECCE.V1I1.59>
- Williams, H. G. (1983). *Perceptual and Motor Development*. Englewood Cliffs, NJ: Prentice-Hall.