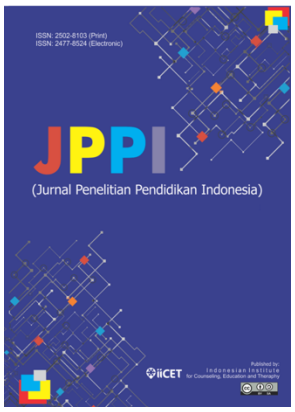
JPPI (Jurnal Penelitian Pendidikan Indonesia)
Volume 11, Number 4 2025



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Publication details, including author guidelines
URL: https://jurnal.iicet.org/index.php/jppi/about/submissions#authorGuidelines
Editor: Fiky Zarya

Article History
Received: 19 Oct 2025
Revised: 20 Nov 2025
Accepted: 30 Dec 2025

How to cite this article (APA)
Nugroho, A., Kustiawan, A. A. & Amalia, N. (2025). Development of a rhythmic gymnastics model to improve motor skills of students with mild special needs. Jurnal Penelitian Pendidikan Indonesia, 11(4), 104-110. https://doi.org/10.29210/020256665

The readers can link to article via https://doi.org/10.29210/020256665

JPPI (Jurnal Penelitian Pendidikan Indonesia)
ISSN: 2502-8103 (Print) | ISSN: 2477-8524 (Electronic)

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Vol. 11, No. 4, 2025, pp. 104-110
DOI: https://doi.org/10.29210/020256665

Development of a rhythmic gymnastics model to improve motor skills of students with mild special needs

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Article Info

Article history:

Received Oct 19th, 2024
Revised Nov 20th, 2025
Accepted Dec 30th, 2025

Keyword:

Rhythmic gymnastics,
Gross motor skills,
Intellectual disability,
Students

ABSTRACT

This study aims to develop rhythmic gymnastics learning model to improve gross motor skills of students with mild intellectual disabilities in special schools. The research employed a research and development (R&D) approach adapted from systematic development stages, including needs analysis, model design, expert validation, limited trials, revisions, and effectiveness testing. The subjects were 40 students with mild intellectual disabilities from special schools in Medan selected through purposive sampling. Data were collected using expert validation sheets, questionnaires, and gross motor skill tests administered through pretest and posttest. Quantitative data were analyzed using paired sample t-tests. The results showed a significant improvement in students' gross motor skills after implementation of the model ($p < 0.05$). The model, characterized by simple, repetitive movements integrated with music, was found to be feasible, practical, and effective for supporting adaptive physical education learning.

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Introduction

Children with special needs are individuals who experience developmental limitations, both physically and psychologically, which affect their ability to participate optimally in learning activities (Capio & Rotor, 2010). Among the various categories of children with special needs, children with intellectual disabilities represent a group that requires specific educational approaches due to limitations in intellectual functioning and adaptive behavior (Wu et al., 2023). In the Indonesian context, children with intellectual disabilities are often classified based on intelligence quotient (IQ), namely mild (IQ 50–70), moderate (IQ 30–50), and severe (IQ < 30), as regulated by AAMD and Government Regulation No. 72 of 1991. Children with mild intellectual disabilities, despite their limitations, still have the potential to develop academic, social, and motor abilities when provided with appropriate educational interventions.

Adaptive physical education plays a crucial role in supporting the holistic development of children with special needs in special schools (Eather et al., 2018). This educational approach is designed to accommodate individual characteristics and abilities, aiming to promote physical activity, self-empowerment, and overall well-being (Felin Fochesatto et al., 2023). The success of adaptive physical education is highly dependent on educators' understanding of students' specific needs and their ability to design suitable learning models (Slattery et al., 2024). Adaptive physical education programs typically include activities that develop fundamental movement skills, physical fitness, dance, water activities, and sports games tailored to students with disabilities.

Children with mild intellectual disabilities commonly experience delays in motor development due to limited sensory-motor capacity and suboptimal organ function (Saidmamatov et al., 2022). These limitations often manifest in difficulties performing gross motor skills such as running, jumping, and maintaining balance (Mariana & Orlando, 2014; Russo et al., 2025). Gross motor skills are essential for daily functioning and independence, as they involve large muscle groups responsible for locomotor and stability movements (Dobrescu & Dobreci, 2014; Firdaus et al., 2018). Therefore, targeted interventions are necessary to address these motor challenges, particularly within adaptive physical education settings (Mihaela & Lavinia, 2014).

One form of physical activity that has the potential to improve gross motor skills is rhythmic gymnastics (Bulca et al., 2020; Cottrell et al., 2023; Rudd et al., 2017). Rhythmic gymnastics integrates body movements with musical rhythms, enabling children to practice coordination, balance, flexibility, and endurance in an enjoyable manner. Children with mild intellectual disabilities often experience difficulties in coordinating movements, responding to stimuli, and maintaining balance, which makes structured and repetitive movement activities particularly suitable for their needs (Capio & Rotor, 2010). Rhythmic gymnastics has been shown to enhance muscle strength, flexibility, and coordination, especially when movements are simple and aligned with children's daily activities (Putro et al., 2024).

In addition, rhythmic gymnastics offers motivational benefits, as music-based movement activities tend to increase students' engagement and willingness to participate in physical activities (Siregar et al., 2024). Despite these potential benefits, learning models used in special schools are often not specifically designed to accommodate the characteristics of children with mild intellectual disabilities, resulting in less optimal development of their gross motor skills. Although previous studies have highlighted the importance of motor skill development for children with intellectual disabilities (Knaier et al., 2023), there is still limited research focusing on the systematic development of rhythmic gymnastics learning models within adaptive physical education contexts, particularly in Indonesian special schools.

Based on these considerations, this study aims to develop a rhythmic gymnastics learning model designed to improve the gross motor skills of students with mild intellectual disabilities in special schools in the city of Medan. This research is expected to provide practical and theoretical contributions to adaptive physical education by offering an effective, engaging, and developmentally appropriate learning model tailored to the needs of children with mild intellectual disabilities (Palmer et al., 2020; Šalaj et al., 2019; Temple et al., 2016).

Method

This research uses a type of development research, which aims to improve the gross motor skills of children with mild intellectual disabilities. The steps are (1) Information gathering (2) Planning (3) Product design (4) Initial product (5) Product revision (6) Small-scale initial product testing (7) Product revision (8) Large-scale product testing (9) Product revision (10) Final product.

The subjects of the research are students with mild intellectual disabilities (SLB tuna grahita ringan), consisting of 40 students from 5 special schools (SLB) in Medan. The sampling technique used by the researcher is purposive sampling. Data collection was conducted through closed questionnaires, which are types of questionnaires with predetermined answers. Additionally, students and teachers were also asked to fill out the questionnaire to gauge their responses to the model. This questionnaire also serves to assess the effectiveness of the model, which measures how much the learning model can influence

the basic manipulation movement skills of students with mild intellectual disabilities through pretests and posttests. Data analysis employed a quantitative approach.

Results and Discussions

Information Gathering

The problems faced by researchers indicate that children with mild intellectual disabilities often experience difficulties in mastering gross motor skills, which can affect their physical and social development. The teaching model implemented by teachers is often not specifically designed to meet their needs, thus it is less effective in improving basic movement skills. Identifying the issues at hand highlights the importance of developing an engaging learning method that can enhance the motivation of children with mild intellectual disabilities to improve their basic movement skills. The researchers plan to develop a learning model based on rhythmic gymnastics, which is expected to increase children's motivation in learning these skills.

Model Feasibility

After the researchers collected data and developed a rhythmic gymnastics-based basic movement learning model to improve the motor skills of children with mild intellectual disabilities, the researchers then conducted a product feasibility test with 3 experts in the field. The results of the product feasibility test are presented in the table below.

Table 1. Results of the Model Feasibility Validation Test

No	Aspect	Expert Validator		
1	Exercise model according to children with mental disabilities	11	10	11
2	The exercise model can improve basic motor skills	8	9	9
3	The security level of the model is in accordance with the standards for children with special needs	9	10	8
Total Score		28	29	28
Percentage		77,78	80,56	77,78
Average			78,70%	
Criteria			Worthy	

Based on the results of the calculations from the validation test against 3 validators of the rhythmic gymnastics-based basic movement learning product model, it obtained an average score of 78.70% in the category suitable for use.

Practicality Analysis

Small Group Trial

The researchers conducted a small-scale test on students with mild intellectual disabilities, involving 10 students from 3 special schools. The small-scale test was used to determine the level of the product that had been implemented. Data from the small group test was obtained from questionnaires given by the researchers to the 10 students, with data collected based on learning aspects. The results of the small group trial are presented in the following table.

Table 2. Small Group Trials

No	Criteria	Learning Aspects	
		Frequency	Percentage
1	Very worthy	2	20%
2	worthy	8	80%
3	Quite decent	0	0%
4	Not worthy	0	0%
5	Very unworthy	0	0%
Sum		10	100%

Based on the results from the table above, it is known that 80% of students stated that the developed product is suitable for use, and 20% said it is very suitable for use.

Large Group Test

After the researchers conducted a small-scale test and the product was deemed fit for use, the researchers then carried out a large-scale group test with 30 students from 4 special schools. The large-scale test was used to determine the level of the product that has been implemented. Here are the results of the large group test.

Table 3. Large Group Test

No	Criteria	Learning Aspects	
		Frequency	Percentage
1	Very worthy	10	33,33%
2	worthy	15	50%
3	Quite decent	5	16,67%
4	Not worthy	0	0%
5	Very unworthy	0	0%
Sum		30	100%

Based on the results from the table above, it is known that 50% of students stated that the developed product is suitable for use, 33.33% said it is very suitable for use, and 16.67% said it is fairly suitable for use.

Effectiveness Test Results

The subjects were given a treatment of a basic movement learning model based on rhythmic gymnastics over a period of 1 month with a total of 14 meetings, 4 times a week. Before receiving the treatment, the subjects underwent a preliminary test or pretest. The results of the pretest and posttest of basic movement patterns using the rhythmic gymnastics-based learning model are presented in the following table:

Table 4. Frequency of Fundamental Movement Skill Tests

	pretest	postest
N	40	40
Mean	7,39	8,75
Std. Deviation	1,261	1,416
Minimum	4	8
Maximum	7	13

The results in the table above show that the mean score for the pretest is 7.39 and for the posttest is 8.75. The standard deviation for the pretest is 1.261 and for the posttest is 1.416. The minimum score for the pretest is 4 and for the posttest is 8. The maximum score for the pretest is 7 and for the posttest is 13. From the results in the table, it is known that there is a difference in the average scores from the pretest of 7.39 to the posttest of 8.75, indicating an improvement from before the treatment was conducted to after the treatment. Subsequently, the researcher conducted a t-test to prove the difference in these results. Below are the results of the t-test for the pretest and posttest.

Table 5. Results of the T Test

Paired Differences	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference	t	df	Sig. (2-tailed)
				Lower	Upper		
Pair 1: Pretest – Posttest	-3.550	2.071	0.421	-4.210	-2.890	-10.886	39

The results of the significance test from the table above indicate a Sig. (2-tailed) value of 0.000 < 0.05, which means there is a difference and an effect in the use of the rhythmic gymnastics-based basic movement learning model to improve the motor skills of children with mild intellectual disabilities.

Children with mild intellectual disabilities experience delays in gross motor development due to limitations in sensory-motor integration, coordination, and physical maturation, which affect their ability to perform daily movement activities (Munir et al., 2022; Capio & Rotor, 2010). The results of

this study indicate that the implementation of a rhythmic gymnastics-based learning model contributes to a measurable improvement in students' gross motor skills, as reflected by the increase in posttest scores compared to pretest scores. This improvement suggests that structured, repetitive, and rhythm-based movement activities are appropriate for addressing motor delays in children with mild intellectual disabilities.

Gross motor learning activities in this study focused on movements requiring balance, coordination, and the activation of large muscle groups, which are fundamental components of motor development (Firdaus et al., 2018). Consistent with previous findings, children with mild intellectual disabilities often struggle with basic movements such as running, jumping, and coordinated body actions due to delayed motor maturation (Hartina & Abubakar, 2019). The observed improvement after the intervention indicates that rhythmic gymnastics can serve as an effective medium for facilitating the mastery of these movements through repeated practice in a structured learning environment.

The findings of this study support previous research highlighting the importance of targeted motor interventions for children with intellectual disabilities (Dobrescu & Dobreci, 2014; Mihaela & Lavinia, 2014). Rhythmic gymnastics, which combines body movements with musical rhythms, provides multisensory stimulation that helps children regulate movement timing, improve coordination, and maintain balance. These characteristics are particularly beneficial for children who experience difficulties in executing precise or complex motor responses (Capio & Rotor, 2010).

Furthermore, rhythmic gymnastics offers motivational advantages, as children tend to respond positively to music-based activities that create a pleasant and engaging learning atmosphere. This finding is in line with Siregar et al. (2024), who emphasized that rhythmic cues help children control their movements more effectively. The use of simple movements accompanied by cheerful music facilitated active participation and reduced boredom during learning sessions, which is essential for children with cognitive limitations.

The design of the rhythmic gymnastics movements in this study was adapted from daily functional activities, such as stepping and directional movements, as also reported by Nurdaningsih (2018). These movements included regular steps, cross steps, sideways steps, and body-turning movements, which are closely related to functional gross motor skills required in daily life. The use of familiar movement patterns allowed students to perform activities more confidently and with better coordination, contributing to gradual improvements in balance, flexibility, and body endurance (Brady et al., 2021; Jones et al., 2016; Krombholz, 2023; Smith & Libertus, 2022).

Despite the positive findings, it is important to acknowledge that the improvement in motor skills may vary among students depending on their initial motor abilities and level of cognitive functioning. Therefore, the role of teachers remains crucial in adapting the intensity, duration, and complexity of rhythmic gymnastics activities to individual student needs. Overall, the results of this study indicate that rhythmic gymnastics-based learning can be an effective and practical approach within adaptive physical education to enhance the gross motor skills of children with mild intellectual disabilities, while also supporting their motivation and active participation in physical learning activities.

Conclusions

Based on the existing research results, it can be concluded that rhythmic gymnastics has an impact on the improvement of gross motor skills in children with mild intellectual disabilities. The importance of gross motor skills for children with mild intellectual disabilities is to develop coordination between body parts effectively. This research also shows that rhythmic gymnastics not only improves gross motor skills but also has extraordinary benefits for children with mild intellectual disabilities, as it can help improve health and physical fitness as well as the self-confidence of children with mild intellectual disabilities. A personal approach is also needed during the implementation because the intellectual limitations of children with mild intellectual disabilities make communication difficult. It is advisable that the implementation of rhythmic gymnastics be created in a fun atmosphere with attractive movements so that children with mild intellectual disabilities are willing to participate in rhythmic gymnastics.

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