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Gross and Fine Motor Development in Adapted Physical Education Learning

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Abstract

Background: Adapted physical education plays a vital role in supporting the motor development of students with special needs by fostering independence, learning readiness, and social participation. Despite its importance, many special schools continue to face challenges in implementing structured motor development programs, particularly in resource-limited contexts where teachers rely heavily on personal initiative and experiential knowledge.
Aims: This study aimed to explore adapted physical education teachers' perceptions of gross and fine motor development training models and to understand how these perceptions influence instructional practices in special education settings.
Methods: A qualitative descriptive approach was employed involving two adapted physical education teachers at a special school selected through purposive sampling. Data were collected through in-depth interviews, non-participatory observations, and documentation analysis, then analyzed using an iterative process of data reduction, data display, and conclusion drawing to identify key themes related to training experiences, instructional adaptation, and contextual challenges.
Result: The findings revealed that teachers demonstrated strong conceptual understanding and adapted teaching practices; however, limited facilities, absence of structured modules, and lack of continuous mentoring constrained the sustainability of motor development programs.
Conclusion: Meaningful motor development in adapted physical education emerges through the interaction between teacher agency, contextual adaptation, and systemic support, highlighting the importance of sustainable training frameworks and collaborative institutional engagement.

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INTRODUCTION

Physical education is an integral component of the education system that contributes not only to physical fitness but also to the cognitive, emotional, and social development of students (Holland & Haegele, 2021). In the context of special education, physical education plays a particularly vital role, as it provides structured opportunities for students with special needs to develop fundamental motor skills that support independence, learning readiness, and participation in daily activities (Willis et al., 2018). For students with disabilities, limitations in movement, coordination, and motor control often create barriers to both academic engagement and social interaction, making motor development a central focus of educational intervention (Grenier et al., 2020; Suggate et al., 2023).

Motor development is commonly understood as comprising two interrelated domains: gross motor skills and fine motor skills. Gross motor skills involve the coordination and control of large muscle groups used in activities such as walking, running, jumping, and throwing, while fine motor

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skills involve precise movements of smaller muscles, particularly in the hands and fingers, required for tasks such as writing, manipulating objects, and self-care activities (Suggate et al., 2023). Research consistently shows that these two domains develop in an integrated manner and jointly influence children's functional abilities, academic participation, and psychosocial well-being (Li et al., 2025). In children with special needs, delays or disruptions in motor development are frequently observed, reinforcing the need for targeted and adapted motor training within educational settings.

Adapted Physical Education (APE) is designed to address these needs by modifying learning objectives, instructional strategies, and activity structures to accommodate students' individual characteristics and abilities. Effective APE programs emphasize flexibility, creativity, and responsiveness to students' functional profiles, enabling meaningful participation regardless of disability type (Antala et al., 2022). Within this framework, teachers play a pivotal role as designers and implementers of motor development programs. Their understanding, beliefs, and professional judgments strongly influence how motor training models are selected, adapted, and applied in practice (Braksiek, 2022).

Despite the recognized importance of motor development in special education, previous studies have predominantly focused on program outcomes or curriculum design, with relatively limited attention given to teachers' perspectives and lived experiences in implementing motor training models in special schools, particularly in resource-limited contexts. Teachers often face challenges such as insufficient facilities, limited instructional time, lack of standardized training modules, and restricted access to continuous professional development, all of which may affect the quality and sustainability of motor training practices (Saiz-González et al., 2025). Understanding how teachers perceive and navigate these challenges is essential for improving the relevance and effectiveness of adapted physical education.

SLB N Tamanwinangun is a special school that serves students with diverse types of disabilities, requiring adapted physical education teachers to continuously adjust instructional approaches and motor training strategies. In this context, teachers' perceptions of gross and fine motor training models become a critical lens through which the quality of adapted physical education can be examined. Teachers' perceptions shape not only their instructional decisions but also their motivation to innovate, adapt activities, and sustain inclusive learning environments (Priestley et al., 2019).

Despite the growing recognition of motor development as a core element of adapted physical education, a significant gap remains in understanding how teachers interpret and implement gross and fine motor training within authentic classroom contexts. Much of the existing literature emphasizes curriculum design or intervention outcomes, while offering limited insight into teachers' lived experiences, professional reasoning, and contextual challenges in special schools. In practice, educators frequently encounter inadequate facilities, limited structured training modules, and minimal opportunities for sustained professional mentoring, all of which influence the continuity of motor development programs. Therefore, this study narrows its scope to exploring teachers' perceptions, implementation experiences, and contextual barriers within a single special school setting. This boundary allows for a focused, contextually grounded analysis that highlights the dynamic interaction between teacher agency, institutional support, and the practical realities of adapted physical education environments today.

Therefore, this study aims to explore in depth the perceptions of adapted physical education teachers regarding gross and fine motor development training models implemented at SLB N Tamanwinangun. By examining teachers' understanding, implementation practices, and perceived challenges, this research seeks to provide a contextualized and holistic account of motor training in adapted physical education. The findings are expected to contribute empirically to the literature on adapted physical education and offer practical insights for the development of more responsive, sustainable, and context-sensitive motor training models for students with special needs.

METHOD

Participants

The participants in this study are adapted physical education teachers who teach at SLB N Tamanwinangun. We chose teachers who are experienced in implementing the gross and fine motor development training model as key informants, namely 2 adapted physical education teachers who

have conducted a gross and fine motor development training model at SLB N Tamanwinangun, namely Mrs. AN and Mrs. ID. We carried out research at SLB N Tamanwinangun, which is in Kebumen Regency, Central Java. It is an SLB that serves students with various types of disabilities. We chose this location because it has an environment that is relevant to the research focus (Putri, 2019). The research time is in June 2025.

Our informant recruitment technique is purposive sampling (Fraenkel et al., 2019), Considering the criteria, the adapted physical education teacher who is active at SLB N Tamanwinangun, has more than one year of teaching experience at the SLB, has participated in training related to the development of gross and fine motor skills or applies the model in learning activities.

Research Design

This study uses a qualitative descriptive approach (Creswell & Creswell, 2018), aims to describe and understand in depth the perception of adapted physical education teachers towards the gross and fine motor development training model at SLB N Tamanwinangun. This approach was chosen because it can reveal the subjective meaning of teachers' experiences in the context of adapted physical education. This qualitative descriptive research design allows us to dig into data naturally and deeply through direct interaction with informants. The focus of the research lies in the interpretation given by adapted physical education teachers to their experience in following and applying training models related to motor development in students with special needs.

Instruments

In this qualitative research, the researcher plays the role of the main instrument, which is directly involved in the process of data collection, processing, and interpretation. The role of the researcher as the main instrument allows for sensitivity, reflectivity, and flexibility in understanding the meaning of the experience of adapted physical education teachers in the context of learning in Extraordinary Schools. To support this role and maintain the directness of data collection, this study uses several supporting instruments, namely semi-structured interview guidelines, observation sheets, and documentation sheets. The instrument has been validated by experts, with the grid in Table 1.

Table 1. Research instrument grid

No	Dimensions	Indicator	Focus Questions/Observations	Data Collection Techniques
1.	Teacher's Understanding of Gross and Fine Motor	Understanding of gross motor concepts	How teachers explain the meaning and function of gross motor for students with special needs	In-depth interviews
		Understanding of fine motor concepts	How teachers understand the role of fine motor skills in students' learning readiness and independence	In-depth interviews
		Motor linkage to student development	The teacher's view of the relationship between motor and the academic, social, and emotional aspects of the student	In-depth interviews
2.	Implementation of the Motor Training Model	Experience in training	Types of training attended, and materials obtained	In-depth interviews

		Characteristics of the training model	Form of training (practical/theoretical), methods, and relevance to student needs	In-depth interviews
		Implementation of training in learning	How teachers implement training results in learning activities	Interviews & Observations
		Adaptation and modification of activities	Modify activities, tools, and methods according to students' abilities	Classroom observation
		Gross motor activity	Types of gross motor training applied in learning	Classroom observation
		Fine motor activity	Types of fine motor exercises applied in learning	Classroom observation
3.	Obstacles to Learning Implementation	Limitations of Facilities and Infrastructure	Availability of tools, media, and supporting facilities for motor learning	Interviews & Observations
		Limitations of teacher training	Availability of advanced training, modules, and professional mentoring	In-depth interviews
		Barriers to implementation in the classroom	Obstacles that arise during the implementation of motor learning	In-depth interviews
		Strategies to overcome obstacles	Teachers' efforts in overcoming learning limitations and obstacles	In-depth interviews
		School environment support	The role of schools in supporting the implementation of motor training and learning	Interviews & Documentation

Procedures

Data collection in this study was conducted through two complementary techniques, namely semi-structured in-depth interviews and non-participatory classroom observations, designed to capture both teachers' reflective perspectives and authentic learning practices. The interview process was carried out individually with each adaptive physical education teacher in a quiet and familiar school setting to create a comfortable and respectful research atmosphere. An interview guide was used to ensure consistency while allowing flexibility for participants to elaborate on their experiences, perceptions, and professional reflections related to gross and fine motor development training. Each interview session lasted approximately 45–60 minutes and was audio-recorded with participants' consent to ensure accuracy and ethical transparency.

Non-participatory observations were conducted during adaptive physical education sessions to document how motor training models were implemented in real classroom contexts. The researcher positioned themselves as an external observer without intervening in the learning process, allowing natural interactions between teachers and students to unfold. Observation notes focused on instructional strategies, activity adaptations, student engagement, and the use of learning media. Field notes were written immediately after each session to preserve contextual details and reflective insights. By integrating interview data with direct observation, the procedures enabled a holistic understanding of teachers' perceptions alongside their enacted pedagogical practices, ensuring methodological rigor and contextual depth consistent with qualitative research standards.

Data Analysis

Data is analyzed using three stages, namely data reduction with the process of selection, simplification, and transformation of raw data into a more structured form, data presentation, organization of data into narrative or visual formats to facilitate interpretation, drawing conclusions to final interpretation based on patterns, relationships, and themes that emerge from the data (Miles et al., 2014). This analysis process is carried out repeatedly and reflectively so that the meaning contained in the participants' experiences and views can be understood in its entirety. With this approach, data analysis is not only oriented to factual findings, but also to contextual understanding that appreciates the dynamics and complexity of learning practices in the field.

RESULTS AND DISCUSSION

Result

We describe in depth the perception of adapted physical education teachers towards the gross and fine motor development training model at SLB N Tamanwinangun. Data was obtained through in-depth interviews and observations of the two main informants, namely Mrs. AN and Mrs. ID, whom we chose purposively because of their direct involvement in the training and implementation of motor learning at SLB N Tamanwinangun.

Teacher's Understanding of Gross and Fine Motor

Both informants showed a good conceptual understanding of differences and the role of gross and subtle motor in the development of students with special needs. Mrs. An explained that gross motor is related to whole-body movements that involve the coordination of large muscles, such as walking, jumping, and throwing. Meanwhile, fine motor involves the ability to coordinate hands and fingers, such as holding a pencil, writing, and buttoning clothes.

> "*If the child cannot coordinate his hands, it is difficult to participate in social activities. Especially for children with special needs, motor skills are the key to independence*" (Mrs. AN).

This statement reflects how motor abilities are perceived not merely as physical competencies, but as foundational skills that enable children to engage meaningfully with their social environment. The emphasis on independence highlights the practical and emotional significance of motor development in the daily lives of students with special needs. Mrs. ID added that motor skills are also related to students' readiness to participate in academic learning and social interaction.

> "*I see children with good fine motor skills, they are more confident. They also quickly learned lessons*" (Mrs. ID).

This understanding shows that teachers not only comprehend motor development at a conceptual level but also recognize its concrete impact on students' confidence, learning readiness, and social participation. Such perspectives indicate a reflective professional awareness in which motor skills are viewed as an integral part of holistic student development, rather than as isolated physical outcomes.

Experience of Following the Training Model

Both teachers reported having participated in training programs related to motor development, either through district-level workshops or internal school-based training. The training models they experienced were predominantly practical in nature and focused on activities that could be directly applied in the classroom, such as the use of simple assistive tools, the development of motor-based games, and techniques for modifying physical education activities to suit students' abilities. Mrs. AN explained that the training she attended was organized by the local education office and emphasized adapted strategies for students with physical impairments.

> "*The training at that time was quite applicable. We practiced directly, and there were also simulations using simple assistive tools*" (Mrs. AN).

This experience illustrates that hands-on training approaches are perceived as helpful by teachers, particularly when they provide concrete examples that can be immediately transferred into daily teaching practice. Practical simulations appear to support teachers' confidence in adapting activities for students with diverse motor needs. In contrast, Mrs. ID highlighted limitations in the training implementation, noting that most training sessions were delivered in a one-way format and lacked follow-up support after completion.

> "*After the training ended, it just ended. We didn't know what came next. There was no mentoring*" (Mrs. ID).

She further emphasized that training materials tended to be general in nature and were not sufficiently tailored to the specific needs of students at SLB Negeri Tamanwinangun. Taken together, these findings indicate that while teachers value opportunities for professional development, the absence of structured follow-up, contextualized materials, and ongoing support reduces the long-term impact of training on instructional practice.

Implementation of Training Result in Learning

Although the training programs they attended were not yet ideal, both teachers made continuous efforts to apply the knowledge gained in their teaching practices. They utilized a range of activities, including simple gymnastics, structured games, and everyday routines that were transformed into educational learning experiences. Mrs. AN described how she adapted a basic ball-throwing activity into an exercise designed to improve balance and coordination for students with gross motor difficulties.

> *"I use a small plastic ball and ask the children to throw it into a bucket. I adjust the distance because not all of them can coordinate well" (Mrs. AN).*

This example illustrates the teacher's sensitivity to students' individual motor abilities and her willingness to modify activities so that each child can participate meaningfully. By adjusting task demands, the activity becomes both achievable and developmentally appropriate for students with varying levels of motor control. Mrs. ID, meanwhile, placed greater emphasis on fine motor development through practical and hands-on activities such as threading beads, drawing patterns, and engaging in simple skill-based tasks.

> *"I train the children using buttons, sticking activities, or arranging small objects. They enjoy it because it feels like playing" (Mrs. ID).*

Both teachers noted that, despite relying largely on personal experience due to limited training support, the knowledge they acquired served as an important foundation for fostering creativity and improvisation in their instructional practices. This finding underscores the role of teachers' reflective engagement and adapted strategies in sustaining meaningful motor development activities within constrained educational contexts.

Obstacles in Implementation

Both adapted physical education teachers identified several key challenges in implementing motor development activities, particularly related to the limited availability of equipment and learning media. The teachers expressed difficulties due to the school's lack of adequate motor skill tools, which often required them to create their own materials or rely on improvised resources. Mrs. AN shared her experience of crafting equipment from recycled materials to support learning activities.

> "*I make the equipment myself from used materials, but it is not always strong or safe*" (Mrs. AN).

This situation highlights the additional responsibility borne by teachers to ensure that learning activities remain functional despite limited resources. While such improvisation demonstrates creativity and commitment, it also raises concerns regarding durability and safety in motor-based learning activities. In addition to material constraints, both teachers emphasized the absence of standardized written guidelines or operational procedures for motor skill instruction in the special school setting. As a result, instructional decisions are largely based on personal experience and individual initiative.

> "*If there were modules, it would be easier for us to apply them. Right now, everything is based on memory and personal initiative*" (Mrs. ID).

Both Mrs. AN and Mrs. ID also expressed concerns about the lack of follow-up training or professional discussion forums after initial training sessions. They felt that opportunities for reflection, evaluation, and professional growth were essential but currently unavailable. These findings suggest that beyond material limitations, the absence of structured guidance and sustained professional support remains a significant barrier to the effective and consistent implementation of motor development programs in adapted physical education.

Discussion

The discussion in this study is directed to interpret in depth the findings obtained through interviews and observations of two adapted physical education teachers at SLB N Tamanwinangun by relating them to the latest theoretical frameworks and empirical findings in the field of adapted physical education. The focus of the discussion lies in how teachers' perceptions of the gross and fine motor development training model affect adapted physical education learning practices in special schools. The qualitative descriptive approach used allows this study to place teachers' experiences and reflections as the main source of meaning, so that the discussion is not directed at generalization, but on a contextual understanding of learning practices in special education that are complex and diverse (Saiz-González et al., 2025).

The findings of the study showed that both teachers had a relatively strong conceptual understanding of the role of gross and fine motor skills in supporting independence, learning readiness, and social participation of students with special needs. This understanding is reflected in the positive response of teachers to the training they have attended, especially training that is practical and applicative. These results are in line with research showing that the positive attitudes and self-efficacy of adapted physical education teachers play an important role in the successful implementation of inclusive and adapted learning in special schools (Antala et al., 2022; Braksiek, 2022). However, this study also reveals limitations in the implementation and sustainability of training, such as the absence of advanced mentoring, structured modules, and adequate institutional support. This condition corroborates the previous finding that the professional development of adapted physical education teachers is often not supported by an ongoing training system, so the implementation of training results is highly dependent on the initiative and personal reflection of teachers (Grenier et al., 2020). In this context, the experience of teachers at SLB Negeri Tamanwinangun reflects the real dynamics of adapted physical education in schools with limited resources. Thus, this discussion emphasizes that the success of motor development of students with special needs is not only determined by the quality of the training provided, but also by systemic support for teachers as the main actors of learning. Teachers' understanding and experience are key factors in creating meaningful, sustainable, and responsive adapted physical education practices to students' needs (Willis et al., 2018).

Teachers' Understanding of Gross and Fine Motor Concepts

Teachers' understanding of gross and fine motor skills shows a good level of pedagogical literacy in the context of exceptional education. Teachers realize that motor development is not only physical, but also closely related to students' social, emotional, and academic abilities. Motor development, both gross and subtle, is an important foundation for the development of daily life and children's readiness to learn (Fajar et al., 2025). Teachers' understanding of the importance of motor integration in the learning process at SLB shows pedagogical awareness of the individual needs of

students with disabilities. Learning in special education must pay attention to the physical and sensory needs of children as the main foundation in academic and social activities (Tinggi et al., 2021).

Teachers' Perceptions of Training Models

Teachers appreciate training that is practical and applicative. This shows that training designed contextually, with a hands-on approach, has an impact on improving the teaching skills of adapted physical education teachers. Effective training not only provides theoretical knowledge, but also involves demonstrations, hands-on practice, as well as support such as coaching or mentoring (States, 2012). Teachers also criticized that the training received tended to be temporary and unsustainable. The absence of training, documentation, and mentoring modules is the main obstacle. This shows that the existing training model has not yet implemented a continuous training approach that changes in teachers' teaching practices can only occur through structured, systematic, and long-term training. (Guskey, 2002). The importance of process sustainability in educational interventions so that the impact of training does not disappear after the activity is completed (Baker et al., 2004).

Implementation of the Training Model in Learning

Teachers demonstrate the ability to apply training outcomes into contextual and adapted learning. The use of simple tools, game modifications, and adaptation of teaching strategies are proof that teachers can integrate training into real situations in the classroom, namely the ability of teachers to actively make pedagogical decisions based on classroom conditions and student characteristics. The teacher's initiative in creating their own teaching aids, modifying activities, and adapting to students' abilities shows a strong professional autonomy (Priestley et al., 2012). This approach is in line with another theory, about the proximal development zone, where the teacher as a learning mediator must be able to aid that is in accordance with the actual abilities and potential of the student's development. The implementation carried out by teachers shows that they function as adapted learning facilitators (Silalahi, 2019).

Perception of Training Effectiveness

Teachers consider that the training that has been followed has a positive effect on increasing knowledge, skills, and confidence in teaching. Effective teacher training can boost confidence and encourage change in learning practices, especially if the training is experiential and collaborative (Altun & Yucel-Toy, 2023). Teachers also consider that training will be more effective if it is accompanied by learning modules, post-training evaluations, reflective discussions, and regular follow-up training. Such support systems are perceived as essential to help teachers internalize new knowledge and translate it consistently into classroom practice. Moreover, ongoing professional engagement provides teachers with a sense of validation and shared responsibility, which is particularly important when working in complex and demanding educational contexts such as adapted physical education.

Implications

The findings of this study carry important pedagogical and institutional implications for the development of adapted physical education in special schools. Teachers' strong conceptual understanding of gross and fine motor development demonstrates that professional awareness can become a powerful foundation for meaningful motor training, even in resource-limited contexts. However, the reliance on personal initiative and improvised teaching materials indicates that adapted physical education should move toward more structured and sustainable support systems. Schools and education authorities need to design continuous professional development programs that integrate practical training, reflective mentoring, and context-sensitive instructional resources. From a broader perspective, strengthening collaboration among teachers, school leaders, and policy stakeholders is essential to ensure that adapted physical education evolves from individual effort into a coordinated educational practice that supports holistic motor development and inclusive participation.

Research Contribution

This study contributes to the growing body of literature on adapted physical education by foregrounding teachers' perceptions and lived experiences as a central lens for understanding motor development training models. While many previous studies emphasize program outcomes or intervention effectiveness, this research highlights the relational and contextual dimensions of teacher agency in shaping adapted learning practices. By integrating analysis of teacher understanding, training experiences, instructional adaptation, and structural challenges, the study presents a holistic perspective that bridges theoretical discourse with classroom realities. Furthermore, the findings extend existing scholarship by illustrating how reflective practice and professional autonomy enable teachers to sustain meaningful motor development activities despite limited institutional support, thereby enriching contemporary discussions on sustainable and context-responsive adapted physical education.

Limitations

Despite offering valuable insights, this study has several limitations that should be acknowledged. The research involved only two adapted physical education teachers within a single special school context, which may limit the transferability of findings to other educational environments with different institutional conditions. The qualitative descriptive design emphasizes depth of interpretation rather than statistical generalization, and therefore the results should be understood as context-specific rather than universal conclusions. In addition, the study primarily reflects teachers' perspectives, while the voices of students, parents, and other educational stakeholders were not directly included. The relatively short duration of data collection may also limit the ability to capture long-term changes in training practices and professional growth.

Suggestions

Future research is encouraged to expand the scope of investigation by involving multiple special schools and a wider range of participants to explore variations in adapted physical education practices across different contexts. Longitudinal studies could provide deeper understanding of how teachers' professional development and training sustainability influence motor development outcomes over time. Researchers are also encouraged to integrate mixed-method approaches that combine qualitative insights with quantitative assessments of motor skill progress. From a practical standpoint, future initiatives may focus on developing structured training modules, peer mentoring systems, and accessible learning resources that support teachers in implementing adapted motor learning more consistently. Such efforts can strengthen the alignment between teacher agency, institutional readiness, and policy support in advancing humane and sustainable adapted physical education practices.

CONCLUSION

This study demonstrates that the expectations presented in the Introduction regarding the importance of understanding teachers' perceptions of gross and fine motor development training are meaningfully reflected in the Results and Discussion. The findings confirm that adapted physical education in special schools is shaped by teachers' conceptual understanding, reflective experience, and adapted instructional practices, which collectively contribute to students' independence, learning readiness, and social participation. This alignment between the initial research aims and empirical findings illustrates that motor development training is not merely a technical intervention but a relational and pedagogical process influenced by contextual realities and professional judgment.

The Results and Discussion further reveal that while practical training experiences enhance teachers' confidence and creativity, the sustainability of motor development programs remains dependent on systemic support, including structured modules, continuous mentoring, and institutional collaboration. Teachers' adapted initiatives demonstrate professional agency; however, long-term effectiveness requires a transition from individual improvisation toward coordinated professional development frameworks that integrate theoretical guidance with contextual application.

Looking forward, this study offers important directions for future research and practice. Further investigations may explore longitudinal impacts of adapted motor training on students'

functional outcomes, comparative studies across special schools, and the integration of universal design principles into adapted physical education. Practically, the findings provide guidance for educators and policymakers to design sustainable training models that combine reflective practice, collaborative learning communities, and accessible instructional resources. Ultimately, this research highlights that meaningful motor development in adapted physical education emerges when teacher agency is supported by structured systems, enabling inclusive and humane learning experiences that respond to the diverse needs of students with disabilities.

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AUTHOR CONTRIBUTION STATEMENT

NS and EB conceptualized the study, developed the research framework, and designed the qualitative methodology. NS conducted field data collection, including in-depth interviews, classroom observations, and documentation analysis, while EB contributed to methodological supervision and analytical refinement. MK supported theoretical development, critical interpretation of findings, and strengthening of the international scholarly perspective. NS prepared the original manuscript draft, and EB and MK provided substantial revisions related to conceptual clarity, academic rigor, and language refinement. All authors reviewed, approved, and agreed to the final version of the manuscript and share responsibility for the integrity, accuracy, and ethical standards of the research process.

REFERENCES

Altun, S., & Yucel-Toy, B. (2023). Transformation of teachers through a collaborative-reflective training model: A case study on school-based professional development. *South African Journal of Education*, *43*(December 2023). https://doi.org/10.15700/saje.v43ns2a2235

Antala, B., Průžek, M., & Popluhárová, M. (2022). Self-Efficacy and Attitudes of Physical Education Teachers towards Inclusion of Pupils with Disabilities. *Sustainability*, *14*(20), 13292. https://doi.org/10.3390/su142013292

Baker, S., Gersten, R., Dimino, J. A., & Griffiths, R. (2004). The Sustained Use of Research-Based Instructional Practice: A Case Study of Peer-Assisted Learning Strategies in Mathematics. *Remedial and Special Education*, *25*(1), 5–24. https://doi.org/10.1177/07419325040250010301

Braksiek, M. (2022). Pre-service physical education teachers' attitude toward, and self-efficacy in, inclusive physical education: Measurement invariance and influence factors. *Teaching and Teacher Education*, *109*, 103547. https://doi.org/10.1016/j.tate.2021.103547

Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (5th ed.). SAGE. https://doi.org/10.4236/ajc.2015.34011

Fajar, M. K., Rusdiawan, A., Wijono, W., & Nugraha, A. C. (2025). Bersepeda Inklusif: Meningkatkan Motorik & Interaksi Sosial Anak Berkebutuhan Khusus Di Tk Roudlotul Hikmah Jombang. *Proficio*, *6*(2), 154–158. https://doi.org/10.36728/jpf.v6i2.4638

Fraenkel, J., Wallen, N., & Hyun, H. (2019). *How to Design and Evaluate Research in Education* (10th ed.). McGraw-Hill Humanities/Social Sciences/Languages.

Grenier, M., Patey, M., Lieberman, L., & Brian, A. (2020). A Collaborative Approach for Engaging Students with Severe Disabilities in Physical Education. *European Journal of Adapted Physical Activity*, *13*(2), 12–12. https://doi.org/10.5507/euj.2020.007

Guskey, T. R. (2002). Professional development and teacher change. *Teachers and Teaching: Theory and Practice*, *8*(3), 381–391. https://doi.org/10.1080/135406002100000512

Holland, K., & Haegele, J. A. (2021). Perspectives of Students With Disabilities Toward Physical Education: A Review Update 2014–2019. *Kinesiology Review*, *10*(1), 78–87. https://doi.org/10.1123/kr.2020-0002

Li, Y., Wu, X., Ye, D., Zuo, J., & Liu, L. (2025). Research progress on the relationship between fine motor skills and academic ability in children: a systematic review and meta-analysis. *Frontiers in Sports and Active Living*, *6*. https://doi.org/10.3389/fspor.2024.1386967

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative Data Analysis: A Methods Sourcebook* (3rd ed.). SAGE Publication.

Priestley, M., Biesta, G., & Robinson, S. (2012). *Teachers as agents of change: An exploration of the concept of teacher agency Working paper no. 1, Teacher Agency and Curriculum Change*. (June 2015).

Putri, Y. L. (2019). Peningkatan Keterampilan Motorik Kasar Pada Anak Disabilitas Rungu Melalui Permainan Sirkuit. *Jurnal Pendidikan Olahraga Dan Kesehatan*, 207–210.

Saiz-González, P., de la Fuente-González, S., Sierra-Díaz, J., & Uría-Valle, P. (2025). Inclusive Education and Physical Education in Spain: A Qualitative Analysis of Teachers' Perspectives. *Education Sciences*, *15*(1), 108. https://doi.org/10.3390/educsci15010108

Silalahi, R. M. (2019). Understanding Vygotsky'S Zone of Proximal Development for Learning. *Polyglot: Jurnal Ilmiah*, *15*(2), 169. https://doi.org/10.19166/pji.v15i2.1544

States, J. (2012). *Effective Teachers Make a Difference*. (May 2019).

Suggate, S. P., Karle, V. L., Kipfelsberger, T., & Stoeger, H. (2023). The effect of fine motor skills, handwriting, and typing on reading development. *Journal of Experimental Child Psychology*, *232*, 105674. https://doi.org/10.1016/j.jecp.2023.105674

Tinggi, S., Kesehatan, I., Klaten, M., Aktifah, N., Prasojo, S., Sarjana, P., Fakultas, F., Kesehatan, I., & Muhammadiyah, U. (2021). *Peningkatan Ketrampilan Guru Slb Dalam Melakukan Latihan Dasar Motorik Halus (Aktivitas Menulis) Pada Anak Cerebral*. 817–822.

Willis, C., Nyquist, A., Jahnsen, R., Elliott, C., & Ullenhag, A. (2018). Enabling physical activity participation for children and youth with disabilities following a goal-directed, family-centred intervention. *Research in Developmental Disabilities*, *77*, 30–39. https://doi.org/10.1016/j.ridd.2018.03.010