

Analysis in The Implementation of Deep Learning Approach in Physical Education and Its Effect On the Social Skills and Participation of Disabled Students at SLB Negeri 2 Yogyakarta

Shirly Della Ismadhita¹, Yuyun Ari Wibowo²

^{1,2}Universitas Negeri Yogyakarta, Yogyakarta, DIY, 55281, Indonesia

ABSTRACT: This research aims to analyze the implementation of a deep learning approach in Physical Education (PE) learning and its effect on the social skills and participation of disabled students at SLB Negeri 2 Yogyakarta (Yogyakarta 2 Inclusive School). This research employed a mixed methods approach with a sequential explanatory design. The research was conducted at SLB Negeri 2 Yogyakarta. The research subjects were 1 PE teacher and 11 disabled students with mild intellectual disabilities taken by using a purposive sampling technique based on the students' level of need. Quantitative data were obtained through observations by using expert-validated observation sheets, while qualitative data were obtained through interviews, observations, and documentation. The reliability test used inter-rater reliability, with a reliability of 85.22%. Qualitative data validity was verified through source triangulation and technical triangulation. Quantitative data were analyzed by using descriptive statistics in the form of percentages, while qualitative data were analyzed by using the interactive model of Miles, Huberman, and Saldaña. The research findings show that the implementation of the deep learning approach in Physical Education (PE) learning has been implemented through mindful, meaningful, and joyful learning, in accordance with the characteristics of students with intellectual disabilities. Observations indicate that interpersonal communication achieves a percentage of 64% (good), cooperation at 81% (very good), active participation at 87% (very good), and emotional engagement at 86% (very good). Interview results confirm that the implementation of varied activities, direct learning experiences, group work, and a pleasant learning environment can improve social skills and student participation. However, the implementation of the deep learning approach still face several obstacles such as limited facilities and infrastructure, differences in student characteristics, and the need for individual mentoring.

KEYWORDS: deep learning approach, intellectual disabilities, PE, social skills, student participation

I. INTRODUCTION

Physical Education (PE) is an integral component of the educational process that contributes not only to students' physical development but also to their cognitive, emotional, and social growth. Through structured physical activities, PE promotes healthy lifestyles, discipline, sportsmanship, interpersonal relationships, and character development, enabling students to achieve balanced physical and psychological well-being (Liang & Liang, 2025). In the context of inclusive education, these objectives should also be achieved by students with disabilities through adaptive physical education programs specifically designed to accommodate their individual needs and abilities.

Adaptive Physical Education is designed to ensure that students with disabilities are able to participate actively and meaningfully in physical activities through modifications in instructional strategies, learning environments, and teaching methods. Besides improving motor competence and physical fitness, adaptive PE also facilitates the development of communication, cooperation, self-confidence, and social participation (Lubis et al., 2024). These objectives are particularly important for students with intellectual disabilities, who generally experience limitations in intellectual functioning, adaptive behavior, communication, emotional regulation, and social interaction. Such characteristics frequently influence their ability to understand instructions, cooperate with peers, and actively participate during Physical Education lessons (Nur Faisah et al., 2023). Consequently, teachers are required to implement learning approaches that not only improve motor performance but also facilitate social and emotional development.

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The implementation of the Merdeka Curriculum has encouraged Indonesian teachers to adopt the Deep Learning approach as a strategy for creating learning experiences that are mindful, meaningful, and joyful. Unlike conventional teacher-centered instruction, Deep Learning emphasizes conceptual understanding, reflective thinking, knowledge transfer, and authentic learning experiences that connect classroom activities with students' real-life situations (Rahmandani et al., 2025). This approach also promotes intrinsic motivation, emotional engagement, critical thinking, and active participation throughout the learning process (Wu & Liu, 2022). Within adaptive Physical Education, Deep Learning has the potential to support students with intellectual disabilities because learning is delivered through direct experience, repeated practice, collaborative activities, and contextual problem solving that correspond to their developmental characteristics (Meo et al., 2026).

A preliminary study conducted at SLB Negeri 2 Yogyakarta indicated that the Deep Learning approach had begun to be implemented in Physical Education learning, particularly through meaningful and joyful learning experiences. Teachers attempted to connect learning activities with students' daily lives, provide varied physical activities, encourage collaborative learning, and create enjoyable classroom environments. Nevertheless, the implementation remained constrained by limited sports facilities, variations in students' characteristics, and the need for intensive individual assistance. Furthermore, although improvements in students' attitudes, responsibility, and simple social interaction were observed, the teacher reported that the overall impact of the approach on students' social skills and participation had not yet been clearly identified because its implementation was relatively recent and not fully structured.

Previous studies have consistently reported that the Deep Learning approach improves students' conceptual understanding, learning engagement, critical thinking, and meaningful learning experiences (Ardha, 2017). However, most previous investigations have focused on general education settings or cognitive learning outcomes, while studies examining its implementation in adaptive Physical Education for students with intellectual disabilities remain limited. Moreover, limited evidence is available regarding how the implementation of Deep Learning influences students' interpersonal communication, cooperation, active participation, and emotional engagement simultaneously within adaptive Physical Education settings. This indicates the existence of a research gap concerning the practical implementation and educational outcomes of Deep Learning for students with intellectual disabilities.

Therefore, this study aims to analyze the implementation of the Deep Learning approach in adaptive Physical Education at SLB Negeri 2 Yogyakarta and examine its impact on the social skills and participation of students with mild intellectual disabilities. Specifically, this study focuses on two dimensions of social skills, namely interpersonal communication and cooperation, as well as two dimensions of learning participation, namely active participation and emotional engagement. The findings are expected to contribute to the development of evidence-based instructional practices for adaptive Physical Education while providing practical recommendations for teachers implementing the Deep Learning approach in special education settings.

II. MATERIALS AND METHODS

A. Research Design

This study employed a mixed methods approach using a sequential explanatory design. The design was selected because the study initially obtained quantitative data to describe the social skills and participation of students with mild intellectual disabilities, followed by qualitative data to provide a deeper explanation of the quantitative findings and the implementation of the Deep Learning approach in Physical Education (PE). The quantitative phase focused on interpersonal communication, cooperation, active participation, and emotional engagement, while the qualitative phase explored the teacher's implementation of Deep Learning, the learning process, and contextual factors influencing its implementation.

The sequential explanatory procedure consisted of two interconnected stages. In the first stage, structured observations were conducted to obtain quantitative information concerning the four observed aspects. In the second stage, qualitative information was collected through interviews with the PE teacher, direct classroom observations, and documentation. The qualitative findings were subsequently used to explain and strengthen the interpretation of the quantitative results. This integration was consistent with the explanatory sequential design, in which qualitative findings are used to provide a more comprehensive explanation of quantitative results.

B. Research Setting and Participants

The study was conducted at SLB Negeri 2 Yogyakarta, located at Jl. Panembahan Senopati No. 46, Prawirodirjan, Gondomanan District, Yogyakarta City, Special Region of Yogyakarta. Data collection was conducted from April to May 2026.

The population consisted of Physical Education teachers and students with intellectual disabilities at SLB Negeri 2 Yogyakarta, comprising 95 students. Participants were selected using purposive sampling based on the level of students' needs. The sample consisted of one PE teacher and eleven students with mild intellectual disabilities from different classes. Students with mild

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intellectual disabilities were selected because they demonstrated relatively better abilities in communication, understanding instructions, and participating in Physical Education activities than students with more severe intellectual disabilities. This characteristic enabled the researchers to observe the implementation of the Deep Learning approach more effectively.

C. Data Sources and Instruments

The study used both primary and secondary data. Primary data consisted of quantitative and qualitative information obtained directly from the research participants and learning activities. Quantitative data were collected through structured observations of students, while qualitative data were obtained through interviews, direct observations, and documentation. Secondary data were obtained from school documents, including lesson plans or teaching modules and formative and summative assessment records.

The quantitative instrument was a structured observation sheet designed to assess four dimensions: interpersonal communication, cooperation, active participation, and emotional engagement. The observation was conducted during three Physical Education learning sessions. The observation scale consisted of four response categories: 1 = behavior never observed, 2 = behavior occasionally observed, 3 = behavior sometimes observed, and 4 = behavior consistently observed. The assessment was based on the frequency and consistency of observable student behavior during learning activities.

The interpersonal communication indicators included responding to teacher instructions verbally or nonverbally, communicating with the teacher and peers, asking for assistance when experiencing difficulties, maintaining eye contact, and expressing preferences related to Physical Education activities. Cooperation indicators included willingness to participate in group or paired activities, sharing equipment, waiting for turns, following simple game rules, helping peers, and completing group tasks.

The qualitative instrument consisted of an interview guide developed to explore the teacher's understanding and experience in implementing the Deep Learning approach. The interview covered the principles of mindful, meaningful, and joyful learning, instructional strategies, differentiation, implementation barriers, students' social skills, participation, contextual factors, problem-solving efforts, and recommendations for improving Deep Learning-based Physical Education. Documentation included lesson plans or teaching modules, assessment records, and photographs of learning activities.

D. Data Collection Procedure

Quantitative data collection was conducted through structured observations during three Physical Education learning sessions. The observations focused on students' observable behaviors associated with interpersonal communication, cooperation, active participation, and emotional engagement. Direct observations were also conducted to record learning processes, interactions, and behaviors that were not fully represented by the structured observation instrument.

Qualitative data were collected through an in-depth interview with the PE teacher. The interview was used to explore how the teacher implemented the Deep Learning approach, adapted learning activities to students' characteristics, encouraged student participation, and addressed challenges encountered during the learning process. Documentation was used as supplementary evidence to strengthen the interpretation of observations and interview findings.

E. Validity and Reliability

The structured observation instrument was validated by experts before being used for data collection. Reliability was examined using inter-rater reliability to determine the consistency of ratings between observers. The resulting reliability coefficient was 85.22%, indicating a high level of agreement between raters.

The credibility of the qualitative findings was established through source and technique triangulation. Source triangulation was conducted by comparing information obtained from the teacher and observations of students, while technique triangulation involved comparing interview findings, direct observations, and supporting documents. This procedure was used to ensure that the qualitative interpretation represented the actual learning conditions.

F. Data Analysis

Quantitative data were analyzed using descriptive statistics in the form of percentages. The analysis was conducted for each dimension of the observed variables: interpersonal communication, cooperation, active participation, and emotional engagement. The resulting percentages were then interpreted according to the observation categories established in the research instrument. The quantitative findings provided an overview of students' social skills and participation during Physical Education learning.

Qualitative data analysis followed the interactive model of Miles, Huberman, and Saldaña. The process involved data reduction, data display, and conclusion drawing and verification. During data reduction, information that was relevant to the research objectives was selected, summarized, and coded. The reduced data were then presented in descriptive narratives, tables, or

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thematic matrices. Finally, conclusions were drawn by identifying patterns and relationships among the emerging themes and verifying them through triangulation.

The final stage involved integrating the quantitative and qualitative findings. Quantitative results obtained from structured observations were connected with qualitative findings from interviews, direct observations, and documentation. This integration allowed the qualitative findings to explain the numerical results and provided a more comprehensive interpretation of the implementation of the Deep Learning approach and its relationship with students' social skills and participation.

III. RESULTS AND DISCUSSION

A. Result

1. Implementation of the Deep Learning Approach in Physical Education

The qualitative findings indicate that the Deep Learning approach had been implemented in Physical Education learning at SLB Negeri 2 Yogyakarta through activities that encouraged students to explore, interact, collaborate, and take responsibility. The teacher provided opportunities for students to assume simple leadership roles, assist peers, participate in group activities, and take responsibility for returning learning equipment after activities. These practices indicate that learning was not solely teacher-directed but provided opportunities for students to become actively involved in the learning process.

The implementation reflected the three principles of Deep Learning identified in the study: mindful, meaningful, and joyful learning. Meaningful learning was demonstrated through direct learning experiences, games, group activities, gradual movement practice, and the assignment of responsibilities that were relevant to students' abilities. Mindful learning was reflected in the teacher's emphasis on following instructions, observing rules, and completing activities progressively. Joyful learning was implemented through varied games and activities that encouraged students to participate without excessive concern about performing movements perfectly.

The teacher also implemented collaborative activities by allowing students with stronger abilities to lead groups or assist peers who experienced difficulties. This provided opportunities for students to practice sharing equipment, waiting for turns, following simple rules, and completing activities together.

However, the implementation was not without challenges. The teacher reported differences in students' characteristics, students' sensitivity to peer behavior, interpersonal conflicts, and difficulties in maintaining discipline. In addition, the school did not have a permanent sports field, requiring the teacher to utilize open spaces, public areas, and other facilities outside the school for Physical Education activities. These conditions required continuous individual assistance and adaptation of instructional strategies.

2. Social Skills

The quantitative results showed that students' social skills were generally in the good category. Social skills were assessed through two dimensions: interpersonal communication and cooperation.

Table 1. Result of Social Skills

Social Skill Dimension	Percentage	Category
Interpersonal communication	64.29%	Good
Cooperation	80.92%	Very Good

Interpersonal communication obtained an average score of $64.29\% \approx 64\%$, categorized as good. The students were generally able to respond to simple teacher instructions, communicate with teachers and peers, and establish eye contact during interactions. Nevertheless, some students still required repeated instructions and individual guidance to understand learning tasks.

Cooperation obtained an average score of $80.92\% \approx 81\%$, categorized as very good. Most students were able to participate in group activities, share equipment, wait for their turns, follow simple game rules, and complete group tasks. Some students still required teacher assistance to remember rules and maintain their involvement in group activities.

The qualitative findings supported these quantitative results. The teacher reported that students with mild intellectual disabilities were generally able to participate in group activities and demonstrated improvements in sharing equipment, waiting for turns, and following activity rules. These behaviors developed through repeated practice and consistent routines. Students with greater difficulties, however, continued to require direct instructions and teacher assistance during group activities.

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3. Student Participation

Student participation was assessed through active participation and emotional engagement. Both dimensions demonstrated very good results.

Table 2. Results of Student Participation

Participation Dimension	Percentage	Category
Active participation	86.36%	Very Good
Emotional engagement	85.83%	Very Good

Active participation obtained an average percentage of 86.36% $\approx$ 87%, categorized as very good. Most students were able to participate from the beginning to the end of the lesson, perform activities according to teacher instructions, remain engaged despite difficulties, and avoid leaving activities without a clear reason.

The qualitative findings indicated that several students who initially showed limited interest in Physical Education became more willing to participate after receiving encouragement and opportunities to try different activities. The teacher emphasized that students were not required to perform movements perfectly; instead, willingness to try was valued. The use of varied activities also encouraged curiosity and reduced boredom.

Emotional engagement obtained an average percentage of 85.83% $\approx$ 86%, categorized as very good. Students generally demonstrated enthusiasm, positive emotional expressions, willingness to try new movements, and limited rejection of learning activities.

The interview findings further indicated that students tended to enjoy Physical Education lessons, particularly when activities involved games, competitions, varied movement activities, or learning outside the classroom. The teacher also noted that students' emotional conditions influenced their participation; students with positive moods tended to participate more easily, whereas students experiencing unstable emotional conditions required more individualized approaches.

4. Overall Findings

Across all observed dimensions, the overall observation score was 79.10%, categorized as good. Active participation obtained the highest percentage (86.36%), followed by emotional engagement (85.83%), cooperation (80.92%), and interpersonal communication (64.29%).

Table 3. Overall Results

Dimension	Percentage	Category
Interpersonal communication	64.29%	Good
Cooperation	80.92%	Very Good
Active participation	86.36%	Very Good
Emotional engagement	85.83%	Very Good

The pattern indicates that students demonstrated stronger participation through direct physical activities and group interaction than through interpersonal communication. Thus, while students were generally able to participate, cooperate, and demonstrate positive emotional responses, interpersonal communication remained the dimension requiring further development.

B. Discussion

1. Deep Learning Implementation in Adaptive Physical Education

The findings indicate that the Deep Learning approach was implemented in adaptive Physical Education through direct experiences, student involvement, collaborative activities, responsibility, and varied learning experiences. The teacher provided students with opportunities to explore, lead groups, assist peers, and take responsibility for simple tasks. Such practices reflect a shift toward student-centered learning in which students are not merely recipients of teacher instructions but participants in constructing meaningful learning experiences.

The implementation of meaningful learning was particularly visible in the use of direct physical experiences. Students learned through practice, games, group activities, and gradual movement exercises rather than relying solely on verbal explanations. This

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finding is consistent with Rahmandani et al. (2025), who describe Deep Learning as an approach that encourages learners to connect new knowledge with previous experiences and apply their understanding in meaningful contexts.

Mindful learning was reflected in the teacher's consistent emphasis on following instructions and rules. The teacher established compliance as a foundation for students to participate effectively in learning. Repeated routines and gradual instructions enabled students to become more accustomed to learning expectations. Nevertheless, some students continued to require repeated instructions and individual assistance, indicating that the implementation of mindful learning needs to be adapted to the characteristics of students with intellectual disabilities.

Joyful learning emerged as another important component. The teacher used games and varied activities and emphasized students' willingness to try rather than perfect performance. This approach appeared to contribute to students' enthusiasm and emotional engagement. The finding is consistent with Andi et al. (2025), who emphasize that Deep Learning provides opportunities for active learning through direct experiences, critical thinking, problem solving, and meaningful engagement.

The findings also highlight the importance of collaborative learning within adaptive Physical Education. Group activities gave students opportunities to share equipment, wait for turns, assist peers, and complete tasks together. The teacher also utilized students with stronger abilities to support peers. This approach provided authentic opportunities to develop social behavior through physical activity. The finding is consistent with Widyastuti et al. (2025), who reported that collaborative and enjoyable learning activities can support students' social interaction.

Nevertheless, Deep Learning implementation should not be understood as a uniform process for all students with intellectual disabilities. Differences in intellectual abilities, emotional conditions, behavioral characteristics, and learning needs required the teacher to provide individualized assistance. This finding is consistent with Ramadhan and Harsiwi (2024), who emphasize the importance of continuous assistance for children with intellectual disabilities during learning activities.

The lack of adequate sports facilities was another contextual challenge. The absence of a permanent sports field required the teacher to use open spaces and facilities outside the school. This finding suggests that the successful implementation of Deep Learning depends not only on instructional strategies but also on the availability and flexibility of the learning environment.

2. Social Skills

The findings demonstrate that students' cooperation skills were stronger than their interpersonal communication skills. Cooperation reached 81%, whereas interpersonal communication reached 64%. This difference suggests that students may find it easier to express social involvement through concrete physical activities than through verbal or interpersonal communication.

Interpersonal communication developed through repeated interaction with the teacher and peers. The teacher used questioning, conversation, apperception, and reflection to provide opportunities for students to respond and express themselves. However, some students continued to require repeated instructions and individualized guidance. This finding is consistent with Pujiwanti et al. (2025), who explain that students with intellectual disabilities retain the capacity to communicate but may require appropriate support and communication strategies.

The relatively higher cooperation score can be explained by the concrete nature of group activities in Physical Education. Students were directly involved in sharing equipment, waiting for turns, following rules, helping peers, and completing group tasks. Such activities provided observable and repeated opportunities to practice social behavior. The teacher's strategy of assigning leadership and peer-support responsibilities further strengthened opportunities for cooperation.

The findings also correspond with Widyastuti et al. (2025), whose study indicates that meaningful, mindful, and joyful learning combined with collaborative activities can support social interaction. In the present study, the use of games, group activities, and responsibility-sharing created opportunities for students to practice cooperation in authentic learning situations.

3. Student Participation

Participation represented the strongest dimension in the findings. Active participation reached 87%, while emotional engagement reached 86%. These findings indicate that students were generally willing to participate physically and emotionally in the learning process.

The high level of active participation was associated in the qualitative findings with varied activities, games, encouragement, and opportunities to try activities without excessive pressure to perform perfectly. The teacher's emphasis on effort and willingness to try appeared to provide a supportive environment in which students could participate despite experiencing difficulties with particular movements.

These findings are consistent with the principle of Deep Learning, which emphasizes direct and active learning experiences. Andi et al. (2025) explain that Deep Learning enables learners to construct understanding through direct experiences rather than

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merely receiving information from teachers. In the present study, such experiences occurred through games, movement practice, demonstrations, and group activities adapted to students' abilities.

The findings also correspond with Haegele et al. (2020), who emphasize that adapted Physical Education should enable students with disabilities to participate actively, safely, and meaningfully. In this study, activities were adjusted to students' abilities, allowing them to experience participation and success within the learning process.

Emotional engagement was similarly high. Students demonstrated enthusiasm, positive expressions, willingness to attempt movements, and limited rejection of activities. The teacher attributed this condition partly to the use of games and varied activities, which reduced boredom and made the learning environment more enjoyable.

This finding is consistent with Al Zibran et al. (2025), who reported that game-based methods can increase students' interest in sports while supporting motor development and interaction with classmates. In the present study, games and varied activities appeared to create positive emotional experiences that supported students' willingness to remain engaged in Physical Education.

However, emotional engagement remained sensitive to individual student conditions. Changes in mood could influence students' willingness to participate, requiring the teacher to adapt instructional strategies according to students' emotional states. Therefore, joyful learning in adaptive Physical Education should not simply mean making activities entertaining; it also requires creating a safe, supportive, and flexible learning environment that responds to individual needs.

IV. CONCLUSION

This study analyzed the implementation of the Deep Learning approach in Physical Education and its contribution to the social skills and participation of students with mild intellectual disabilities at SLB Negeri 2 Yogyakarta. The findings indicate that the approach had been implemented through meaningful, mindful, and joyful learning experiences that encouraged students to explore, collaborate, interact with peers, assume simple leadership roles, and take responsibility during Physical Education activities. Nevertheless, its implementation continued to face challenges related to limited facilities, differences in student characteristics, interpersonal conflicts, behavioral conditions, and the need for continuous individualized assistance.

In terms of social skills, the students demonstrated positive performance, particularly in cooperation. Interpersonal communication obtained a percentage of 64%, categorized as good, while cooperation reached 81%, categorized as very good. Students were able to respond to teacher instructions, communicate with peers, share equipment, wait for turns, follow simple rules, and participate in group activities. These findings suggest that Physical Education activities that provide repeated opportunities for social interaction can support the development of social skills among students with mild intellectual disabilities.

The findings also indicate positive participation in Physical Education learning. Active participation reached 87%, while emotional engagement reached 86%, both categorized as very good. Students generally participated from the beginning to the end of learning activities, demonstrated willingness to try different activities, and showed enthusiasm during lessons. Games, varied activities, meaningful experiences, and a supportive learning environment appeared to encourage both physical and emotional involvement.

Overall, the findings suggest that the Deep Learning approach can serve as an alternative approach for designing adaptive Physical Education that is more meaningful, active, and enjoyable. The integration of quantitative and qualitative findings indicates that the positive levels of students' social skills and participation were supported by learning activities that emphasized direct experience, collaboration, responsibility, and enjoyable participation. However, the findings should be interpreted within the context of the study because the research was conducted at only one special school, involved eleven students with mild intellectual disabilities, included one Physical Education teacher as the main qualitative informant, and collected observations across three learning sessions.

The practical implication is that Physical Education teachers should continue developing varied and meaningful activities that are adapted to the characteristics and abilities of students with intellectual disabilities. Schools should also provide adequate facilities and create learning environments that support students' social interaction and active participation. Future research should involve larger numbers of participants, broader categories of disabilities, longer observation periods, and, where appropriate, other educational subjects to obtain a broader understanding of the implementation of the Deep Learning approach in special education.

V. RECOMMENDATIONS

Based on the findings of this study, several recommendations can be proposed. First, Physical Education teachers in special schools are encouraged to continue implementing the Deep Learning approach through meaningful, mindful, and joyful learning

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activities that are adapted to the characteristics, abilities, and emotional conditions of students with intellectual disabilities. Learning activities should provide students with opportunities to explore, collaborate, communicate, take responsibility, and participate actively rather than focusing solely on the achievement of physical skills.

Second, teachers should provide greater opportunities for students to practice interpersonal communication. Although cooperation and participation were categorized as very good, interpersonal communication obtained a comparatively lower score. Therefore, learning activities can be designed to encourage students to express needs, respond to peers and teachers, ask questions, communicate preferences, and interact during group activities. Repeated instructions, visual demonstrations, peer assistance, and individualized guidance can be maintained according to students' needs.

Third, schools are encouraged to support the implementation of adaptive Physical Education by improving the availability and accessibility of sports facilities and learning environments. Limited facilities were one of the challenges identified in the implementation of Physical Education at the research site. Flexible use of available spaces and appropriate modification of equipment may therefore be considered while gradually improving school facilities.

Fourth, future researchers are encouraged to conduct studies involving a larger number of participants, different specialschool settings, longer observation periods, and broader categories of disabilities. Further research may also employ experimental or longitudinal designs to examine changes in students' social skills and participation over time and to provide stronger evidence regarding the effectiveness of the Deep Learning approach in adaptive Physical Education.

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