



Enhancing Motor Skills in Deaf Children with Special Needs Through the "Post-to-Post" Game Using Visual Card Media

Annisa Sulistianingsih*, Harry Syahputra Nasution

Universitas Pamulang, Indonesia

*Correspondence: E-mail: dosen02844@unpam.ac.id

ABSTRACT

Motor skills are a crucial aspect of the development of deaf children with special needs, as they influence their capacity for physical activity, independence, and participation in the learning process. However, limitations in auditory processing often cause deaf students to encounter obstacles to engaging in movement-based learning activities that require clear, structured instructions. This study aims to enhance the motor skills of deaf children with special needs by implementing a "post-to-post" game using visual card media. The research method employed is Classroom Action Research (CAR), conducted over two cycles; each cycle comprises stages of planning, action implementation, observation, and reflection. The research subjects consisted of 18 deaf students. Data collection techniques involved observation and motor skills testing. The research results demonstrate a significant improvement in the students' motor skills, evidenced by an increase in the average score from 58.3 in the pre-cycle phase to 70.1 in Cycle I and 82.5 in Cycle II. The percentage of learning mastery also rose from 27.8% in the pre-cycle phase to 88.9% in Cycle II. These findings indicate that the post-to-post game supported by visual card media is effective at enhancing the motor skills of deaf students. Consequently, the research success indicators were achieved, and the implemented instructional method can serve as an alternative learning strategy for fostering the motor skills of deaf children with special needs.

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INTRODUCTION

Physical education constitutes an academic discipline that integrates the study of physical activity, sport, and bodily fitness with the broader objectives of developing students' physical, mental, social, and motor dimensions in a holistic manner (Putra et al., 2026). Within formal educational contexts, it forms an indispensable component of the curriculum, channelling planned physical activity toward the enhancement of health, fitness, movement capacity, and character formation (Panjaitan & Fardana, 2023). Its scope is wide, encompassing individual and team sports, gymnastics, games, fitness activities, and diverse forms of movement tailored to the developmental characteristics of learners (Sari et al., 2024).

Despite its recognised importance, the delivery of physical education in special schools remains encumbered by a range of persistent challenges. Students with special needs—particularly those who are deaf—exhibit learning characteristics that diverge substantially from those of hearing peers, as their capacity to receive information through auditory channels is markedly restricted (Olivia & Harsiwi, 2024). This limitation renders the communication of movement instructions, technical demonstrations, and general instructional exchange during physical education lessons considerably more complex (Zuhdi & Harsiwi, 2024). A literature review by Andini (2024) highlights that communication difficulties and limited access to adaptive instructional materials present major challenges in educating deaf students. The research demonstrates that employing structured visual media and sign-language-integrated tools can substantially improve student engagement, learning motivation, and language comprehension.

Analogous challenges have been documented specifically within adaptive physical education. Syafrial and Nopiyanto (2023) established that teachers of adaptive physical education for deaf students must routinely employ direct demonstration, small-group instruction, visual props, and visual media to facilitate comprehension of learning content, given the verbal communication constraints experienced by these learners. Their findings further indicated that the use of visual media simplifies the delivery of movement instructions and substantially increases student engagement throughout the lesson. Visual media also serves additional functions: motivating learners, conserving instructional time, and fostering enjoyment and interest in learning (Sumarsono & Anisah, 2019).

Adaptive physical education occupies a critical role in developing the motor capacities of students with special needs, including those who are deaf. By definition, it represents a modified form of educational provision—adjusted in terms of curriculum, instructional methods, media, games, and evaluation systems—to align with the distinctive needs of students with disabilities (Taufan et al., 2019). Through adaptive physical education, deaf students are afforded equal opportunities to develop movement skills, physical fitness, social competence, and daily living independence (Nopiyanto & Pujiyanto, 2022).

Physical education also plays a pivotal role in optimising children's development, particularly with respect to gross motor skills (Slamet et al., 2025). During the developmental period, structured physical activity supports the acquisition of fundamental movement patterns—including walking, running, jumping, throwing, catching, and balance maintenance—that underpin daily functioning (Muham & Leo Virganta, 2026). Beyond motor capacity, physical education contributes to physical health, self-confidence, social interaction skills, and character formation (Purwanto & Baan, 2022). It is therefore imperative that quality physical education be made accessible to all learners without exception, including children with special needs.

Motor development represents a critical dimension of children's overall growth, as it governs the capacity to perform the varied movement demands of everyday life. According to Darah and Retno (2023), motor development involves the progressive control of bodily movement through the coordinated functioning of the nervous system, musculature, and other physiological systems. Well-developed motor competence enables children to engage effectively in physical activity, supports functional independence, and underpins healthy social and emotional development. In deaf children, motor development warrants particular attention, since the movement learning process is frequently impeded by communication deficits and limitations in comprehending instructional content (Olivia & Harsiwi, 2024).

The legal entitlement of children with special needs to quality education is enshrined in Indonesian Law No. 8 of 2016 on Persons with Disabilities and Indonesian Law No. 19 of 2011 ratifying the Convention on the Rights of Persons with Disabilities (CRPD). These legislative frameworks affirm that every individual with a disability holds an equal right to access educational services appropriate to their needs. Accordingly, adaptive physical education must be designed innovatively to accommodate the specific learning characteristics and requirements of deaf students.

Deaf students are individuals whose auditory function is impaired to a degree that significantly restricts their ability to receive verbal information through conventional channels. Nonetheless, their physical potential for motor development is broadly comparable to that of typically hearing children, provided they receive appropriate stimulation and tailored instructional support. In learning contexts, deaf students characteristically rely on visual processing as their primary mode of receiving and interpreting information. Research by Imeldasari et al. (2025) demonstrated that the judicious use of visual media can markedly enhance learning effectiveness for deaf students by optimising their inherent visual processing strengths.

Converging evidence from additional studies underscores the significant contribution of visual-based approaches to improving deaf students' conceptual understanding and skill acquisition. Azmi et al. (2025) found that the integration of sign language, instructional video, visual aids, and modified game activities substantially facilitated deaf students' comprehension of physical education instructions. These visual strategies also demonstrably improved students' motivation, participation levels, and self-confidence during instructional activities.

Preliminary observations conducted by the researcher at SKH Muara Sejahtera, South Tangerang, revealed that a substantial proportion of deaf students encountered persistent difficulties in following movement instructions during physical education lessons. These difficulties were manifested in poor movement coordination, inaccurate task execution, and low levels of active participation. The restricted availability of appropriate instructional media further compounded these challenges, hampering students' ability to interpret and act upon teacher guidance. These observations are consistent with the broader literature identifying the scarcity of visual media and the presence of communication barriers as the primary determinants of unsatisfactory learning outcomes among deaf students (Murni & Fahmi, 2026).

One promising instructional alternative capable of addressing these challenges is the post-to-post game supported by visual card media. This activity affords students concrete, embodied learning experiences through enjoyable physical engagement while simultaneously providing visual scaffolding for movement instruction at each activity station. This approach aligns closely with the visual and kinaesthetic learning preferences characteristic of deaf students. The present study therefore aimed to investigate and improve the motor skill

performance of deaf students at SKH Muara Sejahtera through the systematic implementation of the post-to-post game with visual card media, positioned as an effective and contextually appropriate innovation in adaptive physical education for students with special needs.

METHODS

Research Design

This study adopted a Classroom Action Research (CAR) design based on the model developed by Kemmis and McTaggart, implemented across two cycles. Each cycle encompassed four sequential stages: planning, action, observation, and reflection. The CAR model was selected because it affords the researcher the capacity to undertake systematic, iterative instructional improvement grounded in reflective analysis at the conclusion of each cycle, enabling the prompt identification and remediation of challenges encountered during the learning process (Arikunto et al., 2019). The two-cycle structure was designed to enhance the motor skills of deaf students through the progressive application of the post-to-post game with visual card media. Cycle I focused on introducing the game format and supporting students' initial adaptation to the game rules and the visual card system. Cycle II was subsequently implemented as a direct response to the reflective findings of Cycle I, incorporating refined instructional strategies, strengthened visual instruction, and improved management of activity stations.

Participants

The study participants comprised 18 deaf students enrolled at SKH Muara Sejahtera, South Tangerang. All participants were characterised by restricted verbal communication capacity alongside a relatively well-developed visual processing ability, which served as the primary cognitive resource for learning. The selection of deaf students as research subjects was guided by the results of preliminary observations, which indicated that the majority of students experienced marked difficulties in interpreting movement instructions and demonstrated motor skill levels that fell below the school's established mastery criteria.

Sampling Procedure

A total sampling approach-also referred to as saturated sampling-was employed, whereby all members of the population were included as research subjects. This technique is appropriate when the population is sufficiently small that complete inclusion is both feasible and desirable (Sugiyono, 2019). All 18 deaf students at the school were therefore enrolled as participants. Total sampling was specifically chosen because classroom action research targets the improvement of instructional processes within an intact learning group, necessitating the full involvement of all students in the applied intervention (Arikunto et al., 2019). Furthermore, the inclusion of the entire population enabled the researcher to obtain a more comprehensive and ecologically valid account of the effectiveness of the post-to-post game with visual card media in developing deaf students' motor skills.

Research Instruments and Materials

The following instruments and materials were utilised in this study:

- (1) Visual card media: Pictorial cards depicting the fundamental movement tasks to be performed by students at each activity station. Each card displayed coloured illustrations accompanied by simplified symbols and directional cues designed in accordance with the visual learning characteristics of deaf students.

- (2) Game equipment: Cones, plastic balls, hoops, ropes, and additional movement support equipment used to facilitate motor activity at each station.
- (3) Student activity observation sheet: A structured instrument used to record student engagement throughout the lesson, covering dimensions of attention, participation, instruction-following capacity, and cooperative behaviour.
- (4) Motor skills assessment rubric: A criterion-referenced rubric used to evaluate students' movement performance against indicators of balance, movement coordination, accuracy of execution, agility, and independent task completion.

The use of visual card media was grounded in research evidence demonstrating that deaf students process visually presented information more effectively than verbal instructions alone (Azmi et al., 2025). Visual media additionally supports sustained attentional focus, improved comprehension of instructional content, and heightened student participation in learning activities.

Observation Indicators

Observation indicators were developed in accordance with the characteristic features of adaptive physical education and addressed the following dimensions: (1) student attention to teacher guidance and visual media; (2) ability to interpret the instructions depicted on visual cards; (3) active participation across all game activities; (4) capacity to complete movement tasks at each station independently; (5) cooperative behaviour and peer interaction during learning; and (6) disciplined adherence to game rules. Motor skill assessment was conducted using the following indicators: balance, movement coordination, agility, movement accuracy, and independent completion of movement sequences.

Data Collection Procedures

Prior The intervention was delivered across two cycles, each comprising four stages, as detailed below.

Cycle I - Planning: The researcher prepared instructional modules, developed visual card media, designed the post-to-post activity structure, constructed observation instruments, and established research success criteria. The game was configured around four distinct stations, each targeting a different motor activity: zig-zag walking, hoop jumping, target throwing, and static balance maintenance.

Cycle I - Action: The teacher introduced the game rules through live demonstration accompanied by visual card support. Students were organised into small groups and rotated between stations in a predetermined sequence.

Cycle I - Observation: The researcher and a collaborating teacher systematically observed student behaviour throughout the lesson. Observed dimensions included student engagement, capacity to interpret visual instructions, movement accuracy, and peer interaction during game play.

Cycle I - Reflection: Observational and motor assessment data were analysed to identify pedagogical challenges encountered during implementation. Reflection outcomes indicated that a subset of students continued to require teacher assistance in sequencing activities and interpreting card symbols. These findings informed the modifications implemented in Cycle II.

Cycle II: Cycle II followed the same procedural structure as Cycle I, incorporating targeted refinements derived from the reflective analysis. Modifications included supplementary movement demonstrations prior to game commencement, redesigned symbols for greater clarity, and individualised corrective feedback delivered to students throughout the session.

The overarching aim of Cycle II was to consolidate and extend the gains achieved in Cycle I by deepening students' engagement with the visual card system and maximising active participation, thereby optimising motor skill development.

Data Analysis

Data were analysed using a descriptive quantitative approach. The analytical procedure involved computing mean motor skill scores, calculating the proportion of students achieving the learning mastery criterion, and comparing outcomes across cycles. The research success criteria stipulated a minimum mean score of 75 and a minimum mastery rate of 80%.

RESULTS

The findings of this study document a progressive and statistically meaningful improvement in the motor skills of deaf students at SKH Muara Sejahtera, South Tangerang, across successive phases of the intervention. In the pre-cycle phase, prior to the introduction of the post-to-post game, the class mean score was 58.3 and the proportion of students achieving the mastery criterion stood at only 27.8%, indicating that the majority of students had not yet attained the minimum performance standard. Following the implementation of Cycle I, the mean score increased to 70.1 and the mastery rate rose to 55.6%, reflecting meaningful but as-yet-incomplete progress. Subsequent application of the refined Cycle II intervention produced a further and more marked improvement, with the mean score reaching 82.5 and the mastery rate rising to 88.9%. These results confirm that the established research success indicators—a mean score of at least 75 and a mastery rate of at least 80%—were fully achieved by the conclusion of Cycle II.

Table 1. Progressive Improvement in Students' Motor Skills Across Research Phases

Research Phase	Mean Score	Mastery Rate (%)
Pre-Cycle	58.3	27.8
Cycle I	70.1	55.6
Cycle II	82.5	88.9

The trajectory of improvement across phases clearly demonstrates the cumulative effectiveness of the post-to-post game intervention. The mean score increased by 11.8 points from the pre-cycle to Cycle I and by a further 12.4 points from Cycle I to Cycle II, indicating an accelerating rate of improvement as students developed familiarity with the game format and the visual card system. Similarly, the mastery rate improved by 27.8 percentage points in the first cycle and by a further 33.3 percentage points in the second, achieving the target of 80% by a substantial margin.

DISCUSSION

Optimisation of Visual Modality in Deaf Students' Learning

The findings of this study provide robust evidence that the post-to-post game supported by visual card media significantly enhances motor skills in deaf students. Improvements were evident not only in quantitative learning outcomes but also in the observable quality of students' participation, the accuracy of their movement execution, and their overall level of engagement throughout the instructional process. These outcomes can be explained through the integrated application of visual learning theory, motor learning principles, and active learning approaches within the framework of adaptive physical education.

The effectiveness of visual card media confirmed in this study reflects the well-established tendency of deaf students to rely predominantly on the visual channel as their primary source of information. Presenting movement instructions through pictorial representations furnishes learners with a concrete cognitive referent that simplifies the decoding of instructional content and reduces dependence on verbal communication. This is consistent with evidence demonstrating that visually grounded instruction significantly improves conceptual understanding and skill acquisition in students with hearing impairments (Nofiaturrehman, 2018). Beyond its communicative function, the use of visual media also contributes to the formation of internal mental representations of movement, a process identified as a foundational component of motor learning. According to Sabilla et al. (2021), clear mental representations facilitate an individual's capacity to plan, regulate, and self-evaluate the movements they perform, thereby supporting more autonomous and accurate motor execution.

Observational data gathered during the study corroborate these theoretical propositions. Prior to the introduction of visual cards, many students struggled to determine the correct sequence of movements required at each activity station. Following the introduction of the cards, students demonstrated markedly greater independence in reading and enacting instructions, navigating the circuit more fluently with minimal teacher intervention. This shift underscores the function of visual card media as a form of scaffolding—a temporary but targeted support structure that enables learners to construct their own understanding of movement tasks and progressively reduces reliance on external guidance.

Active Learning and Increased Student Engagement

The post-to-post game format created a student-centred learning environment characterised by sustained active engagement, which is well-established as a prerequisite for motivation and meaningful participation. By positioning students as active agents moving through and performing at each station, the intervention enabled learning through direct physical experience rather than passive observation. This aligns with findings from recent research demonstrating that game-based learning and activity-centred instructional models can substantially enhance intrinsic motivation and active involvement in physical education contexts. The multi-station structure of the post-to-post game also afforded students repeated opportunities for peer interaction and cooperative task completion, dimensions of learning that are particularly significant for deaf students, whose social engagement in classroom settings is often constrained by communication barriers.

The Role of Repetitive Practice in Motor Skill Development

A further key mechanism underlying the observed improvements was the repeated execution of structured movements across stations and cycles. Within a motor learning framework, repetition serves to consolidate neuromuscular pathways and progressively increase the efficiency and automaticity of movement coordination. The structured design of the post-to-post game ensured that each student completed the full circuit of motor tasks at every session, thereby accumulating the practice volume necessary for skill acquisition and refinement. As the degree of practice increased across cycles, corresponding improvements in movement balance, coordination, agility, and accuracy were observed. This finding is consistent with the motor learning literature, which consistently identifies practice quantity and quality as the primary determinants of skill consolidation.

Implications for Adaptive Physical Education

Taken together, the effectiveness of the post-to-post game with visual card media cannot be attributed to any single mechanism but rather to the synergistic interaction of three complementary processes: the optimisation of the visual learning modality, the creation of an actively engaging instructional environment, and the provision of structured repetitive practice. These findings carry significant implications for the design and delivery of adaptive physical education for deaf students. The intervention demonstrated that meaningful motor skill development is achievable within this population when instruction is thoughtfully aligned with students' sensory and cognitive learning preferences and when the instructional medium facilitates independent comprehension of movement tasks.

Future research should expand the scope of investigation to include larger and more diverse samples drawn from multiple special schools and inclusive educational settings, in order to enhance the generalisability of findings. Longitudinal designs incorporating follow-up assessments would enable examination of the durability of motor skill gains and the retention of learning over time. Comparative studies examining the relative efficacy of different visual media formats-such as pictorial cards, video demonstrations, digital technology-based applications, and virtual reality environments-within adaptive physical education would also contribute valuably to evidence-based instructional practice in this field.

CONCLUSION

The present study demonstrated that the implementation of the post-to-post game supported by visual card media is effective in enhancing the motor skills of deaf students at SKH Muara Sejahtera, South Tangerang. Progressive and significant improvements were recorded across all phases of the study: the class mean score rose from 58.3 in the pre-cycle to 70.1 in Cycle I and 82.5 in Cycle II, while the proportion of students achieving the mastery criterion increased from 27.8% to 88.9%. Both established research success indicators-a minimum mean score of 75 and a minimum mastery rate of 80%-were fully achieved. These outcomes confirm that the post-to-post game, when integrated with a well-designed visual card system, constitutes a viable and effective instructional intervention for developing motor skills in deaf students within the adaptive physical education setting.

IMPLICATION

The findings of this study carry several practical implications for adaptive physical education. First, teachers of deaf students are encouraged to systematically integrate visual-based instructional media into their physical education lessons as a primary means of communicating movement tasks and ensuring student comprehension. Second, the post-to-post game model presented in this study offers a replicable and adaptable instructional template that educators may adopt as an innovative, student-centred, and contextually appropriate strategy for motor skill development in special educational settings. Third, curriculum developers and school administrators should consider formalising the use of visual instructional media and game-based learning formats within adaptive physical education frameworks, given the demonstrated effectiveness of these approaches for learners with hearing impairments. Finally, future studies are encouraged to develop and test additional variations of activity-based learning methods targeting the diverse needs of students with special needs, with a view to broadening the evidence base for inclusive and adaptive pedagogy.

AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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