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Enhancing Self-Competence: Developing Inclusive Outdoor Learning Media for Children with Special Needs at Sekolah Alam Catur Cendikia

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Abstract

Outdoor learning has potentials to support children's motor, social, and self-confidence development, including children with special needs. However, its implementation in inclusive schools remains limited due to the lack of safe and adaptive learning media. This community engagement initiative aimed to develop inclusive outdoor learning media in the form of a mini wall climbing facility at Sekolah Alam Catur Cendikia, Bandung Regency. It also sought to enhance teachers' capacity to utilize the media effectively in learning activities. The implementation was carried out through four stages including preparation, media construction, socialization and trial use, and evaluation, through a participatory approach involving lecturers, community service (KKN) students, teachers, and school stakeholders. Program evaluation was conducted using user satisfaction surveys, media feasibility assessment forms, observations, and interviews. The results indicated that the developed media was perceived as attractive, inclusive, and beneficial in promoting student engagement, more meaningful learning experiences, and social interaction. Although limitations were identified in terms of additional safety equipment, this program still provides a practical reference for inclusive schools in developing outdoor learning media to optimize learning environments and support the contextual implementation of activity-based outdoor learning.

Keywords: Outdoor Learning; Inclusive Learning Media; Children with Special Needs; Elementary School; Community Engagement

1. Introduction

Children with special needs are individuals with unique characteristics who require specific attention in the learning process due to physical, intellectual, emotional, or social barriers (Lestari, 2025). In the context of modern education, inclusive education has become a fundamental element in ensuring that every child has equal and dignified access to education. Since its initial declaration through UNESCO's *Education for All* movement (Meka et al., 2024), inclusive education has emphasized the provision of adaptive, non-discriminatory educational services that accommodate diverse student abilities, as also reflected in Indonesia's national policy on inclusive education (Ministry of National Education Regulation No. 70 of 2009). This approach extends beyond curriculum modification and instructional strategies to encompass the creation of learning environments that promote active participation, respect for diversity, and the optimal development of each individual's potential (Menge et al., 2023). Through inclusive education, children with special needs are expected to develop according to their capacities and participate more independently and constructively in social life (Kasman, 2020).

Sekolah Alam Catur Cendikia is one of the educational institutions committed to implementing these principles of inclusivity. Located in Bojong Koneng Atas Street, Cibeunying, Cimenyan District, Bandung Regency, the school adopts a nature-based educational approach that integrates classroom instruction with outdoor activities to support students' exploration and independence. Currently, the school serves 20 students, seven of whom are children with learning disabilities, including autism spectrum disorder, attention deficit hyperactivity disorder (ADHD), and Down syndrome.

Children with learning disabilities often face challenges in processing information, following the pace of instruction, or understanding abstract concepts, despite having cognitive abilities comparable to their peers (Laiyan, 2022; Widiada et al., 2021). Consequently, they require more adaptive learning approaches and instructional media that foster self-confidence, independence, and social skills (Jaya et al., 2018; Menge et al., 2023). Outdoor learning

has emerged as a relevant strategy in this context, as physical and motor-based activities have been shown to contribute significantly to emotional development, courage, and social interaction skills among children.

However, Sekolah Alam Catur Cendikia face challenges related to the provision of safe, inclusive, and well-structured outdoor learning facilities. Although the school has a relatively large open area, outdoor learning facilities, particularly instructional media that support the development of self-competence among children with special needs, remain very limited. This constraint directly affects students' opportunities to develop independence, motor skills, and self-confidence through exploratory activities. In fact, outdoor learning media function not merely as recreational tools but also as critical instruments for strengthening courage, motor coordination, collaboration, and decision-making skills (Humberstone & Stan, 2012; Idros et al., 2023).

Previous studies further indicate that the quality of inclusive education is influenced not only by the availability of physical facilities but also by teachers' readiness to manage diverse student needs (Firdausyi, 2024; Kasman, 2020). Teachers in inclusive schools often require specialized training to design learning activities that are safe, meaningful, and appropriate for children with special needs. Likewise, parents play an essential role in ensuring continuity of stimulation and support outside the school environment. Synergy among schools, teachers, and parents therefore becomes a crucial factor in optimizing the use of outdoor learning facilities.

Based on these conditions, the community engagement program entitled *"Enhancing Self-Competence: Developing Inclusive Outdoor Learning Media for Children with Special Needs at Sekolah Alam Catur Cendikia"* was designed to provide a concrete solution to the challenges of outdoor learning facility provision at the school. The program focused on the implementation of a single outdoor learning medium, a mini wall climbing facility, designed to enhance courage, motor strength, and problem-solving abilities among children with special needs in a structured manner. The mini wall climbing facility was selected due to its adaptive characteristics, ease of modification, and demonstrated effectiveness in supporting the development of children's self-competence.

In addition to facility development, the program included training for teachers and parents on strategies for utilizing wall climbing activities within inclusive learning contexts. Through this training, teachers were expected to integrate physical activities with instructional objectives, while parents gained a better understanding of how to support their children's development in a sustainable manner. Through collaboration between the higher education institution and the school, this initiative not only generated direct benefits for students and educators but also strengthened the academic contribution of Politeknik Manufaktur Bandung to the advancement of inclusive education and community engagement.

2. Methods

2.1. Site and Participants

This community engagement program was conducted at Sekolah Alam Catur Cendikia, located in Cimenyan District, Bandung Regency. The school is a nature-based educational institution that implements contextual learning through direct interaction with outdoor environments. As an inclusive school, Sekolah Alam Catur Cendikia serves students with diverse learning abilities, including seven children with special needs who require specific support related to motor, social, and cognitive development. The school was selected as a partner due to its priority need for safe, adaptive, and developmentally appropriate outdoor learning facilities for children with special needs.

Program implementation was carried out through close collaboration among the lectures, students, and the partner school, and it was also integrated with the Community Service program (*Kuliah Kerja Nyata* / KKN) of Engineering Technology Management study program. KKN students were actively involved in supporting initial observations, assisting in media construction and trial implementation, facilitating outdoor learning activities, and contributing to documentation and evaluation processes. The collaboration also involved classroom teachers, helper/special needs support teachers, the school principal, and other technical support staff, to ensure that the development of mini wall climbing could align with the thematic curriculum, supported gross motor development, and stimulated students' courage and social interaction. All activities were conducted over a two-month period (October–November 2025) using a participatory approach that positioned all stakeholders as integral contributors to the school empowerment process.

2.2. Stages of Program Implementation

The program was implemented through four main stages: (1) preparation, (2) media development, (3) socialization and trial use, and (4) evaluation. During the preparation stage, the team coordinated with school stakeholders, conducted site observations, identified the needs of teachers and children with special needs, and developed the technical design and budget plan. The second stage focused on the construction of the mini wall climbing facility, including material procurement, fabrication of metal or wooden frames, installation of ergonomic climbing panels and handholds, application of child-safe paint, and structural strength testing in accordance with child safety standards. Meanwhile, the third stage involved training teachers on the use of the media, trial implementation with both regular students and children with special needs, collection of user feedback, and mentoring on integrating the media into thematic learning activities. The overall implementation was designed to remain flexible in order to anticipate

potential challenges, such as weather variability, spatial limitations, the diverse needs of children with special needs, and teachers' time constraints.

2.3. Data Collection and Success Indicators

Data collection employed a combination of direct observation, brief interviews with teachers and parents, survey satisfaction as well as photo and video documentation to assess both process quality and intervention impact. Program success indicators included: (1) the construction of a safe and functional mini wall climbing facility; (2) the participation of at least 80% of students and five teachers in media trial activities; (3) the successful implementation of teacher training with positive participant responses; (4) observable improvements in student participation, courage, and social interaction, particularly among children with special needs; and (5) the completion of comprehensive activity documentation in accordance with community engagement standards. These indicators served as the basis for evaluating the effectiveness of the intervention in enhancing the quality of inclusive outdoor learning.

2.4. Data Analysis

Data analysis employed a descriptive quantitative and qualitative approach to obtain a comprehensive understanding of the effectiveness and feasibility of the developed outdoor learning media. Quantitative data were collected through a user satisfaction survey evaluating the mini wall climbing facility. The survey instrument consisted of 17 items, including 15 closed-ended questions using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree) and two open-ended questions designed to capture more in-depth feedback from respondents.

The closed-ended items assessed several key aspects: (1) visual appeal and design of the media, (2) inclusivity and suitability for children with special needs, (3) pedagogical usefulness in supporting learning activities and comprehension, (4) support for student social interaction, (5) sustainability and long-term potential use of the media, and (6) overall user satisfaction. Quantitative data were analyzed descriptively by calculating mean scores for each indicator to represent respondents' perceptions and satisfaction levels.

In addition to the satisfaction survey, media feasibility was evaluated using a feasibility assessment form completed by the school principal, who possesses the authority and contextual understanding of safety standards and instructional needs within the school. This assessment focused on structural durability and safety aspects, including frame stability, handhold strength, surface safety, and overall suitability for use by both regular students and children with special needs. The feasibility results provided an objective basis for determining the readiness of the media before and during the trial implementation phase.

Qualitative data were obtained from brief interviews with teachers and parents, direct observations during program activities, and responses to open-ended survey questions. These data were analyzed using thematic categorization to identify patterns in perceptions, experiences, and recommendations for improvement. The integration of quantitative and qualitative data enabled a more comprehensive evaluation of the functionality, safety, and educational impact of the outdoor learning media within an inclusive education context.

3. Results and Discussion

4.1 Temperature and Relative Humidity Performance

The community engagement initiative entitled *"Enhancing Self-Competence: Developing Inclusive Outdoor Learning Media for Children with Special Needs at Sekolah Alam Catur Cendikia"* was designed as an integrated intervention that extended beyond the provision of physical facilities to include the strengthening of teachers' capacity and the optimization of students' learning experiences, particularly for children with special needs. This section presents the program outcomes and key findings in a systematic manner, organized according to the four main stages of implementation: preparation, media development, socialization and trial use, and evaluation.

Figure 1. Coordination with the School Principal and Initial Site Observation

The preparation stage served as a critical foundation to ensure that the developed outdoor learning media was closely aligned with users' needs. Through intensive coordination with school administrators, classroom teachers, special education support teachers, and parents, the community engagement team conducted site observations and

mapped student characteristics, with particular attention to children with learning disabilities. The findings revealed that while the school possessed adequate outdoor space, it lacked learning media specifically designed to foster courage, gross motor development, and student independence. This initial assessment provided a clear rationale for the subsequent development of targeted inclusive outdoor learning media.

During the preparation phase, the team also started to draw of the technical design of the media and calculated the Cost Budget Plan (*Rencana Anggaran Biaya*). This phase was conducted through a participatory approach that carefully considered child safety, ease of use, and the sustainability of media utilization. This approach proved to be appropriate, as reflected in the high level of user acceptance of the media design. Satisfaction survey data indicated that the indicator measuring the suitability of the media design to children's characteristics achieved a mean score of 4.82, while the visual attractiveness of the media reached a mean score of 4.91. These findings suggest that a well-structured preparation phase contributed directly to the quality and acceptability of the developed outdoor learning media.

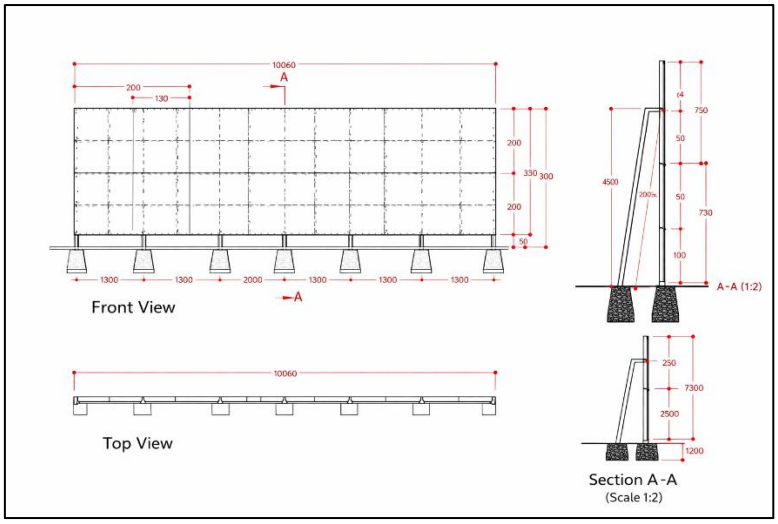

Figure 2. Mini Wall Climbing Design

Meanwhile, the second phase focused on the physical construction of the mini wall climbing facility as inclusive outdoor learning media. The construction process encompassed material procurement, frame fabrication, installation of panels and ergonomically designed climbing holds, application of child-safe paint, and structural strength testing. All stages were implemented in accordance with safety and inclusivity principles, considering that the media would be used by students with diverse physical and cognitive abilities.

The results of the durability assessment checklist indicated that the mini wall climbing facility was categorized as safe and suitable for use, achieving a mean score of 4.75. This finding was further supported by survey data on the indicator of media durability and structural strength during outdoor use, which obtained a mean score of 4.27, classified as good. Throughout the trial period, no structural damage or injury incidents were observed, confirming that the construction process met essential child safety standards. These findings demonstrate that inclusive outdoor learning media can be safely developed in inclusive school settings when supported by adequate technical planning and consistent supervision.

Figure 3. The Construction Process of Mini Wall Climbing

The third phase involved socialization activities, training for teachers on the use of the media, and trial implementation of the mini wall climbing facility with both regular students and children with special needs. During this stage, teachers were not only introduced to the technical aspects of using the media but were also guided in integrating climbing activities into thematic learning. This facilitation encouraged teachers to link physical activities with learning objectives, such as reinforcing basic numeracy concepts, introducing spatial directions and positions, and fostering vocabulary development and social interaction.

Figure 4. Socialization and Trial Use of the Mini Wall Climbing Media

Data from the satisfaction survey indicated that this phase generated a significant pedagogical impact. The indicator stating that *the media helps students become more active and motivated in learning* obtained a mean score of 4.45. Meanwhile, the indicators *the media makes learning activities more meaningful* and *the media helps children understand learning materials in a more enjoyable way* achieved mean scores of 4.64 each. In addition, the indicator *the media supports inclusive learning and is easily understood by all children* received a very high mean score of 4.91, underscoring the media's effectiveness in accommodating the diverse needs of children with special needs.

These satisfaction survey results confirm that the socialization and trial implementation phase of the mini wall climbing media not only enhanced student engagement and learning motivation but also strengthened the quality of meaningful and inclusive learning. The high mean scores across indicators related to activity, comprehension, and inclusivity demonstrate that the media is effective as adaptive outdoor learning media. It successfully bridges the learning needs of regular students and children with special needs simultaneously and contributes substantially to the creation of enjoyable, participatory learning experiences oriented toward the development of students' self-competence.

The final stage of the program involved evaluation and closing activities aimed at assessing media effectiveness, user satisfaction, and the potential sustainability of the initiative. Overall, user satisfaction was categorized as very high, with a mean score of 4.55 for the overall satisfaction indicator. Student enthusiasm in participating in learning activities achieved a mean score of 4.73, while the indicator reflecting the desire for the media to be further developed and sustainably utilized also reached a mean score of 4.73. These findings indicate that the mini wall climbing facility was not merely perceived as an additional facility but was regarded by the school as a long-term learning asset.

Figure 5. Evaluation stage and Closing Ceremony

Nevertheless, the evaluation results also highlighted several recommendations for further refinement of the media design, particularly regarding the reinforcement of the structure, the addition of varied levels of challenge, and the completeness of safety features in the use of the mini wall climbing facility. During the initial implementation stage, the provision of additional safety equipment, such as protective helmets, elbow pads, or standard climbing mats, could not be fully accommodated due to limitations in budget allocation and the program's implementation timeline.

Although climbing activities were conducted under close supervision and the media design met basic child safety standards, these inputs constitute important reflections for future development. Enhancing safety aspects in a more comprehensive manner is essential to align the media with the principles of safe outdoor learning and learner well-being (Humberstone & Stan, 2012; Idros et al., 2023).

Overall, this stage-based discussion demonstrates that the success of the community engagement program was not determined by any single phase but by the integration of careful planning, the development of safe and adaptive learning media, sustained pedagogical facilitation, and data-driven evaluation involving multiple stakeholders. These findings align with the perspective that the quality of inclusive education depends not only on the availability of physical facilities but also on teachers' readiness, a supportive learning environment, and synergy between schools and the broader community in accommodating diverse learner needs (Kasman, 2020; Menge et al., 2023). Accordingly, this program underscores that the development of inclusive and contextual outdoor learning media has the potential to meaningfully and sustainably enhance the self-competence of children with special needs when implemented through a collaborative, needs-based approach.

5. Conclusion

This community engagement program resulted in the development and implementation of inclusive outdoor learning media in the form of a mini wall climbing facility designed to accommodate the characteristics of children with special needs. Through a participatory approach involving lecturers, community service (KKN) students, teachers, the school principal, and parents, the program facilitated the provision of adaptive outdoor learning facilities and encouraged teachers to integrate the media into thematic learning activities. Evaluations conducted through satisfaction surveys, media feasibility assessments, observations, and interviews indicated positive responses regarding the media's usefulness in supporting student engagement, social interaction, and more contextual learning experiences.

Furthermore, the findings highlight that the development of inclusive outdoor learning media requires the integration of careful planning, safety-oriented media design, pedagogical facilitation, and data-driven evaluation. Several limitations were identified, particularly in relation to the availability of additional safety equipment and the diversification of challenge levels due to constraints in time and resources.

6. Suggestions

This initiative provides a practical reference for inclusive schools seeking to optimize learning environments through the use of outdoor learning media. Future development is recommended to prioritize the enhancement of safety features, including the provision of standardized protective equipment and reinforced structures, to ensure higher levels of child safety. In addition, strengthened and continuous teacher facilitation is essential to maximize the pedagogical potential of outdoor learning media within inclusive classroom contexts. Finally, long-term and longitudinal evaluations are recommended to more comprehensively examine the sustained impact of outdoor learning media on the motor, social, and self-competence development of children with special needs.

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