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Training and Practice of Recreational Sports Education Models for Students with Intellectual Disabilities based on Flipbook for Physical Education Teachers

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Abstract

Background: A gap in adapted physical education services for children with mild intellectual disabilities remains a challenge, particularly in terms of teachers' ability to design engaging and meaningful lessons.
Aims: This community service activity was carried out in collaboration with KKG SLB Kebumen with the aim of improving the competence of physical education teachers through training in adventure education-based learning models using digital flipbook modules.
Method: The program was implemented in five stages, namely socialization, training, technology application, mentoring, and sustainability. The flipbook module contains four educational games Ambenbol, Bowna, Spomas, and Lampubol designed to develop motor, communication, and socio-emotional skills of children with mild intellectual disabilities.
Results: The pretest–posttest results showed a significant improvement in four aspects of teacher competency: adaptive learning design (increased by 25%), application of game-based learning (25%), motor development evaluation (22%), and utilization of digital technology (37%).
Conclusion: These findings indicate that the use of flipbooks can strengthen teachers' creativity and increase student participation in adaptive physical activities. This activity contributes to improving the quality of inclusive learning in special needs schools and serves as a model for continuous training for physical education teachers in various regions. A follow-up program is recommended to expand the use of interactive technology and strengthen the collaborative network between

A. Introduction

Children with disabilities in Indonesia experience significant inequalities in education, health, and social inclusion (Abdullah et al., 2022; Mira et al., 2023), according to the first in-depth analysis of children with disabilities in Indonesia. In Indonesia's education sector, despite a 29 percent increase in the number of inclusive schools (Widiastuti & Winaya, 2019), children with disabilities are less likely to access and complete formal education compared to their peers without disabilities (Fitri et al., 2022; Han et al., 2024).

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Children with intellectual disabilities experience delays in cognitive development and learning learning processing difficulties (Heister et al., 2023; Urbański et al., 2021). However, most schools and educators have not provided relevant inclusive services. Children with intellectual disabilities benefit more from concrete, structured, and visual learning approaches. One of the learning characteristics of children with intellectual disabilities is that they find it difficult to think and tend to learn through concrete experiences. Children with special needs must be able to be independent, adapt, and compete with children in general. On the other hand, children with special needs are not automatically able to perform physical activities. This will have an impact on the development and improvement of physical abilities and motor skills. Adaptive Physical Education contributes to helping children with special needs in the development and improvement of their physical abilities and motor skills (Sukriadi & Arif, 2021).

Policies regarding persons with disabilities are regulated in Law No. 8 of 2016, article 2, letter c, which states the fulfillment of equal opportunities for persons with disabilities in all aspects of state and community administration, respect, protection, and fulfillment of the rights of persons with disabilities, including the provision of accessibility and appropriate accommodation. This is also emphasized in Government Regulation No. 52 Article 53 of 2019, which states that persons with disabilities must be given access to education, health, social, employment, and economic services.

B. Methods

The main issue identified at KKG SLB Kebumen was that the PJA learning approach still focused mainly on sports improvement and socialization. However, other aspects needed to be considered, namely learning methods that involve physical activity for children with intellectual disabilities. Educators at KKG SLB Kebumen also do not yet have reference modules to create innovative PJA learning methods that can improve the physical condition and motor skills of students with disabilities. Therefore, a practical and easily accessible learning module was required to all educators at KKG SLB Kebumen without being constrained by time and place. Additionally, the lack of technology, facilities, and resources to support innovative learning methods is another challenge faced. This issue limits the scope for developing more modern and innovative PJA learning methods.

The steps taken to address partner issues were carried out through five stages, beginning with socialization. Socialization was aimed at educators and students of KKG SLB PJOK Kebumen. The second stage consisted of structured training sessions, followed by the integration of flipbook-based technology. The technology applied was in the form of a flipbook-based module. After the technology implementation stage, it is followed by mentoring and evaluation for educators. The final stage emphasized program sustainability through the establishment of a professional learning community. A flipbook is a type of software application that can be used to develop electronic learning modules. It functions as an editing tool and provides features that support the creation and modification of digital learning content (Ramadhina & Pranata, 2022).

Program management consisted of five stages: socialization, teacher training, coaching, flipbook technology implementation, assessment, and continuous improvement. Socialization is the initial phase of implementation. The primary goal of this phase was to provide partners, specifically KKG SLB Kebumen, a firm knowledge of the program. Work with partners to decide on the best time, place, and schedule for the socialization exercises. Teachers from KKG SLB Kebumen make up the team, which gives them a chance to talk and listen. The socialization exercise will take place at the partner's location, KKG SLB Kebumen, and span two meetings. Educators are expected to comprehend the goals and advantages of adventure education-based teaching strategies for children with intellectual disabilities. After the socialization, there will be a mentoring phase for SLB teachers. This mentoring will involve several students and all teaching staff to practice adventure education-based learning methods for children with intellectual disabilities through modules with a flipbook concept. Each educator will practice the games from the adventure education learning method one by one and learn how to implement them. In addition, educators will also be provided with guidance on the flipbook-based module as a concrete and practical solution for educators.

Next is the technology implementation stage, which is the focus in the development and application of adventure education-based learning modules for children with intellectual disabilities using the flipbook concept, which can be easily accessed by educators at KKG SLB Kebumen. Partners are given learning experiences using technology that can be accessed by all devices, including smartphones, tablets, computers, and certain other devices. The implementation will involve KKG SLB Kebumen teachers,

especially PJA teachers. The mentoring and evaluation stage aimed to provide support to KKG SLB Kebumen teachers in implementing the adventure based PJA learning method for children with intellectual disabilities and developing learning modules based on flipbooks. Preliminary results were evaluated in terms of effectiveness and practicality as perceived by KKG SLB Kebumen educators. The program that has been running will be evaluated and continuously developed to become a better program. Partners are assisted in implementing the syntax (according to the stages) of PJA learning based on adventure education using flipbooks.

Four types of games were applied to the concept of adventure education. They are: 1) Lampubol; 2) Spomas; 3) Bowna; 4) Ambenbol. Adventure-Based Learning Design Education "Lambung Pukul Bola (Lampubol)" rules of the game: a) The teacher prepares the equipment and playing area; b) The teacher divides the students into groups, with each group consisting of at least two children; c) Each group is given three colored balls and decides who will throw the ball and who will hit the ball; d) Each child gets three chances to bounce and catch the ball, then throws it to their partner. The throwing distance to the partner is 2 meters; e) The teacher then gives the command "start," one child begins throwing and catching, then the ball is given to their partner to hit; f) The game is played alternately; g) The game ends when the designated number of balls are used up.

"Spons Remas" (Spomas) rules of the game: a) The teacher prepares the tools and place for the game; b) The teacher places the sponges, water, and buckets in the prepared place; c) The teacher divides the children into two groups, with each group consisting of at least two children; d) Next, the teacher gives the command "start," and the children begin to take 2 sponges to hold in their right and left hands and then put them into the bucket filled with water; e) After the sponges are filled with water, the children begin jumping over 4 cones that have been provided to give to their friends. The next friend's turn is to carry the sponges while jumping over the 4 cones that have been provided until the finish line; f) At the finish line, the sponges are then squeezed to remove the water and placed in the bucket; g) The game ends when the bucket at the finish line is filled with water.

"Bowling Warna" (Bowna) rules of the game: a) The teacher prepares the equipment and playing area; b) The teacher divides the children into groups, with each group consisting of at least two children; c) Next, the teacher gives the command "start," and the children begin rolling/throwing the ball toward the bowling pins, which have been set up 2-3 meters away, throw the ball toward the bowling pins arranged 2-3 meters away; d) For each bowling pin that falls, the child must be able to name the color of the bowling pin; e) Then the children in one group get ready to run to grab the flag corresponding to the color mentioned by their friend; f) The game ends when all the bowling pins have fallen, and the children can name the colors and grab the flags corresponding to those colors.

"Ambil Bendera Antar Bola (Ambenbol)" rules of the game: a) The teacher prepares the equipment and place for the game; b) The teacher places the flags and colored balls in predetermined places; c) The teacher divides the children into two groups, with each group consisting of at least two children; d) Next, the teacher gives the command "take the flag," and the children begin running to find the colored flags that have been prepared; e) After the children successfully obtain the colored flag, they raise it up while saying "colored flag"; f) Next, the children in one group start running to find the ball that matches the color of the flag that has been mentioned; g) The game ends when the children successfully take, name the flag and take the ball that matches the color of the flag.

Table 1. Game Type

No	Game Type	Description
1	Lampubol *(Lambung Pukul Bola)*	Ball Bounce
2	Spomas *(Spons Remas)*	Sponge Relay
3	Bowna *(Bowling Warna)*	Color Bowling
4	Ambenbol *(Ambil Bendera Antar Bola)*	Flag-and-Ball Relay

The image below shows some of the equipment needed to carry out the program. It includes colored flags, colored bowling pins, balls, and rackets.

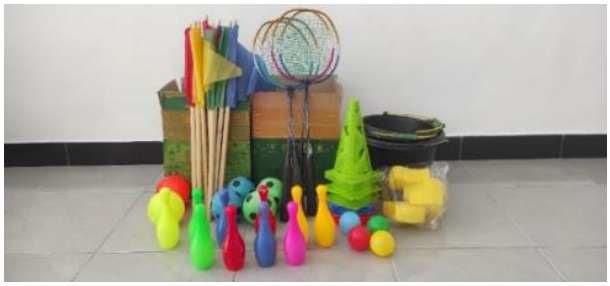

Figure 1. Equipment Needed

C. Results and Discussion

1. Results

The long-term impact of adventure education was observed to increase self-confidence, independence, communication, teamwork, life skills, intrapersonal skills, and decision making (Prince, 2021). The primary objective of this activity was to design and implement an adventure education–based PJA model to develop students' motor skills and increase their participation in physical activities. This activity also aims to improve the quality of teaching staff in providing PJA learning methods. Implementing a flipbook module to serve as a reference module in implementing the PJA learning method based on adventure education at KKG SLB Kebumen. The flipbook module contained all necessary files and multimedia resources. The application of this digital module is a good solution for providing a more effective and practical learning atmosphere. The teaching materials displayed contain informative and interactive animations, which improve student enthusiasm as conveyed by the teaching staff.

Figure 2. Joint Training for Physical Education Teachers and Technology Practice with Students with Disabilities

From a quantitative perspective, the effectiveness of the program was measured through pre-tests and post-tests that assessed four aspects of teacher competence, namely adaptive learning design, adventure education-based learning implementation, evaluation of student motor development, and utilization of digital technology.

Table 2. Pre-test on Physical Education Teacher's Knowledge Level

No	Initial Name	Aspects Assessed			
		Adaptive learning design	Implementation of learning based on recreational games	Evaluation of student's motor development	Use of digital technology (FlipBook)
1.	LLD	58	54	60	48
2.	TRT	55	53	59	47
3.	FAH	57	55	61	50
4.	MAA	52	50	55	45
5.	MFD	60	57	63	53
6.	DKW	56	52	58	49
7.	DNA	54	51	57	46
8.	MRP	59	56	62	52

No	Initial Name	Aspects Assessed			
		Adaptive learning design	Implementation of learning based on recreational games	Evaluation of student's motor development	Use of digital technology (FlipBook)
9.	Bayu BNR	53	50	56	47
10.	LRB	55	52	58	48
Average		**56**	**53**	**59**	**49**

Table 2. The pre-test results describe the initial conditions of PJOK SLB Kebumen teachers before participating in the training. The average score for adaptive learning design was only 56 percent, adventure education-based learning implementation was 53 percent, student motor development evaluation was 59 percent, while the use of digital technology was the lowest aspect with an average of 49 percent. These results indicate that teachers still have limitations in managing adaptive physical learning, especially in the integration of digital technology. Furthermore, the post-test results are presented in Table 3.

Table 3. Post-test on Physical Education Teacher's Knowledge Level

No	Initial Name	Aspects Assessed			
		Adaptive learning design	Implementation of learning based on recreational games	Evaluation of student's motor development	Use of digital technology (FlipBook)
1.	LLD	83	80	82	87
2.	TRT	80	78	81	85
3.	FAH	82	79	83	86
4.	MAA	78	75	77	83
5.	MFD	85	82	84	90
6.	DKW	81	77	80	84
7.	DNA	79	76	78	83
8.	MRP	84	81	83	88
9.	Bayu BNR	79	76	78	84
10.	LRB	81	78	80	85
Average		**81**	**78**	**81**	**86**

Table 3. Post-test results show significant improvement after teachers participated in training and mentoring. The average ability of teachers in designing adaptive learning increased to 81 percent, the implementation of adventure education-based learning reached 78 percent, the ability to evaluate students' motor development was 81 percent, and the use of digital technology increased sharply to 86 percent. These results indicate that the flipbook module greatly helped teachers improve their pedagogical and technological skills (as clarified in Table 4 regarding the comparison between pre-test and post-test results).

Table 4. Comparative Analysis of Pre-Test and Post-Test

No.	Aspects Assessed	Pretest (%)	Posttest (%)
1.	Adaptive learning design	56	81
2.	Implementation of learning based on recreational games	53	78
3.	Evaluation of student's motor development	59	81
4.	Use of digital technology (FlipBook)	49	86

Table 4. Comparative Analysis of Pre-Test and Post-Test confirms an improvement in all aspects of teacher competence. Adaptive learning design increased by 25 percent, adventure education-based learning implementation rose by 25 percent, student motor development evaluation increased by 22 percent, while the use of digital technology showed the highest increase of 37 percent. This significant difference is strong evidence that the community service program has successfully addressed teachers' needs in developing their adaptive physical learning management capacities.

Overall, these quantitative results are in line with the qualitative findings obtained during the program implementation, where teachers felt more confident in designing and implementing learning, and students showed better engagement in adaptive physical activities.

2. Discussion

The results indicated that consistent implementation of recreational/traditional games improved participants' physical fitness across several domains, including endurance, strength, and motor coordination. These findings align with literature on physical activity–induced physiological adaptation, which posits that engagement in recreational sports promotes cardiovascular and musculoskeletal improvements. For example, Rudiyanto et al. (2025) reported that traditional games have a significant effect on students' physical fitness after treatment compared to the control group.

In the context of motivation and interest, the study found that students/partners became more active and enthusiastic in participating in sports activities when elements of play and recreation were incorporated into the program. Intrinsic motivation theory suggests that activities that are enjoyable activities with challenge and social interaction boost intrinsic engagement (Kindermann et al., 2016; Temel et al., 2024). These findings are reinforced by Hasibuan & Khairani (2024), who reported that although the effects on physical fitness are not always significant, the effects on learning motivation are very strong.

The purpose of this community service program is not only to improve physical fitness and motivation, but also to strengthen the social and emotional aspects of participants through interaction in recreational games. This approach is in line with the theory of developmental social-emotional learning, where interaction between participants in games helps build cooperation, empathy, and emotional regulation. For example, in a study by Pramudyanto et al. (2023), it was found that traditional games had a significant impact on students' emotional intelligence, even though the increase in physical fitness between the experimental and control groups was not always significant.

From the goal of making recreational sports an inclusive and accessible alternative, the results show that traditional games are indeed easier to implement in a local context because they do not require expensive equipment and remain culturally appealing. This supports the theory of sustainable physical activity, which states that the sustainability of a sports program depends on ease of access, cultural relevance, and participant satisfaction (Afacan, 2021; Bittner et al., 2020; Lourenço et al., 2015). Research by Marpaung et al. (2025), shows that the modified circuit training or Firedorr Games learning model can also serve as a bridge between formal and recreational sports, with positive results in student motivation and fitness.

However, there are several obstacles that arise, such as variability in individual responses, time constraints, facilities, and human resources (knowledgeable instructors). Behavior changes theories and the socio-ecological model emphasize that sustainable physical behavior change requires environmental support, school/community policies, and consistency of activities are needed (Aldenaini et al., 2020; Trotter et al., 2020). Without such support, the intensity of recreational sports activities may decline after the intervention phase ends. This is also evident in the literature by Masdiana et al. (2021), for example, in studies on student physical fitness, physical activity tends to decline as the level of education increases if sports/recreational extracurricular activities are not maintained.

This community service activity has important implications for schools and physical education institutions routinely incorporating recreational/traditional games into the physical education curriculum or extracurricular activities can improve students' physical fitness, motivation to learn, and emotional well-being (Bodnar et al., 2020; Chaichitwanidchakol & Feungchan, 2020; Vickerman & Maher, 2018). This means that schools need to consider allocating time and resources (space, instructors, materials) for these activities so that they are not just a one-off project. At the policy and community levels, this community service is implicative for local governments and education agencies to support recreational sports as part of public health and character development efforts (Lee & Hassim, 2023). Policies that incentivize or integrate recreational sports into health, youth, and education programs will strengthen program sustainability and encourage broader participation. For example, support for the provision of green open spaces, the organization of traditional game festivals, or subsidies for minimal equipment can be part of the strategy.

2.1. Implications

This community service activity made an important contribution by providing digital learning modules that can be directly used by physical education teachers at special needs schools. These products serve as a new reference for teachers when developing more varied learning scenarios that are relevant to the

characteristics of their students. In addition to producing teaching tools, this activity also encouraged the formation of a community of practitioners that allows teachers to learn from and share experiences with one another. This contribution expands the practice of adaptive learning that can be applied in other areas with similar conditions.

2.2. Research Contribution

This community service activity made an important contribution by providing digital learning modules that can be directly used by physical education teachers in special needs schools. These products serve as a new reference for teachers when developing more varied learning scenarios that are relevant to the characteristics of their students. In addition to producing teaching tools, this activity also encouraged the formation of a community of practitioners that allows teachers to learn from and share experiences with one another. This contribution expands the practice of adaptive learning that can be applied in other areas with similar conditions.

2.3. Limitations

Although the programme ran smoothly, there were several factors that limited its results. Limited school facilities meant that some games could not be played to their full potential. The short implementation period also meant that the teacher assistance process was not as thorough as it could have been for all the targeted competencies. The level of digital readiness among teachers also varied, so adaptation to the use of flipbooks was not uniform. On the other hand, the diverse characteristics of students with intellectual disabilities meant that learning progress evaluations still needed more time to produce a more comprehensive picture.

2.4. Suggestions

For future activities, the duration of teacher assistance needs to be extended so that game-based learning can be consistently implemented in the classroom. The development of digital modules can also be improved by adding practical video examples or more detailed evaluation instructions. Facility support from schools and the government is highly recommended so that recreational games can be carried out more freely and safely. In addition, further research reviewing the long-term impact on students' motor skills and social interaction will provide more complete information for future programme development.

D. Conclusion

Overall, the findings of the study conclude that recreational traditional games are truly capable of improving physical fitness and psychological aspects such as motivation and emotional well-being of participants, especially children/adolescents in formal/non-formal educational contexts. The advantages of this method lie in its simplicity, low cost, cultural suitability, and high appeal to participants. However, for these results to be sustainable and provide long-term benefits, environmental support (facilities, instructors, policies), consistency in implementation, and comprehensive evaluation of physical, psychological, and social aspects are required. If these supporting elements are in place, recreational sports have great potential to become an instrument for the physical and character development of the younger generation.

Scientifically, this community service contributes local empirical data on the effectiveness of recreational/traditional games in improving physical fitness and learning motivation in specific regional contexts. The addition of contextual data is important because many previous studies used samples from large cities or with adequate facilities; this community service shows that even in contexts with limited resources, the benefits are still there. Beyond the academic aspect, this activity practically builds the capacity of teachers, instructors, and community managers in designing and implementing recreational sports games. Partners in this service learn appropriate methods, adaptation of local games, group management, fitness monitoring, and evaluation of results. This has a long-term impact: more skilled teachers/instructors can continue the program more independently without always relying on outside parties.

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F. Author Contribution Statement

EB: paying a role in designing community service programs, implementing activities in the field, drafting initial manuscripts, coordinating with partners, analyzing activity results, and refining manuscripts.
PA and AA: responsible for designing community service programs, implementing activities in the field, and drafting initial manuscripts.
ETM, HWF, IU, R, NY, ALI: Played a role in coordinating with partners, analyzing activity results, and refining the manuscript.
All authors contributed actively and approved the final manuscript submitted for publication.

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