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SORAKDASTRA: Innovation in Learning Media to Enhance Basic Movement Skills of Blind Students

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Abstract: The purpose of this research is to improve the basic movement skills of blind students through the application of SORAKDASTRA media in circuit training. SORAKDASTRA utilizes circuit training, which is used to conduct basic movement exercises tailored to the types of basic movements in physical education learning. The research method employed is developmental. This development research uses the ADDIE model design (Analysis, Design, Development, Implementation, Evaluation). The data collection instrument is a questionnaire using media assessment instruments and basic movement skills instruments. Data analysis in this study was conducted using quantitative descriptive analysis. Data collection was carried out over one month and included six accompanying sessions. Subsequently, the basic movement tasks designed for the students were validated by experts and practitioners in physical education with scores of 98.6% for adaptive physical education experts, 97.3% for motor skills experts, 98.6% for blind experts, 94.6% for media experts, and 85.3% for surface design experts. SORAKDASTRA is a book made from scrap fabric and embroidered in 3D to create a raised effect on the images of basic activities. Based on statistical analysis, the results of the non-parametric test for skills were significant (Sig<0.05), indicating an improvement in the learning outcomes for non-locomotor, locomotor, and manipulative basic movement skills among students at SLB A. The learning outcomes for the students improved by 57% using the N-Gain test. Based on data analysis and discussion, it can be concluded that teachers and blind students greatly need the SORAKDASTRA learning media to enhance basic movement skills (non-locomotor, locomotor, and manipulative).

Keywords: Basic movement skills, Media learning, SORAKDASTRA

Introduction

Physical Education (PE) is one of the subjects that emphasizes the development of both physical and intellectual capabilities. It involves movement learning that includes competition, training, and Olympic-style activities. Physical Education is also regarded as an academic discipline because one of its purposes is to serve as a measure to train and discipline students in the learning process according to their abilities. PE also holds significant importance in the international community as education and physical health (Hofhuis et al., 2024; Zhou, 2024). One of the competencies required of teachers in designing physical education learning tools is to modify equipment to suit the needs of students (Winnick & Porretta, 2017). This competence is also essential for physical education teachers in special education schools, as they can develop tools, media, and learning devices according to the specific characteristics of students with disabilities (Lieberman et al., 2018). Physical education in schools plays a role in helping students achieve growth and development—physically,

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mentally, emotionally, and socially-that matches their potential, including through physical education activities (Nugrohowati & Raharjo, 2023; Febriyanti & Pramono, 2022). This implies that every individual has an equal right to learn and receive education without regard to ethnicity, race, religion, status, class, including students with special needs (Francisco et al., 2020).

Adaptive education teachers can easily develop media to tailor the needs of all blind students so that physical education can be effectively conducted (Purtilo-Nieminen et al., 2021). Special education refers to education programmed according to the needs of an individual who has specific learning requirements, conducted by specialized teachers. Visual impairment refers to individuals who face barriers or issues with their vision (Vellin & Hairani, 2023). The classification of blind students includes two types: blind and low vision (Praptaningrum, 2020). Therefore, the learning process for these students requires special methods, stages, and supports specifically for physical education for the blind (Arifin-Bustanol et al., 2022). To achieve this, creativity is needed from teachers to facilitate students in conducting physical education learning activities, such as using learning media that fits the characteristics of the students (Yulianti et al., 2022). Learning media are anything that can convey a message from a planned source, stimulating an individual's thoughts, feelings, attention, or interest so that a learning process can occur (Wulandari et al., 2023; Batubara, 2020). Other research suggests that the development of learning media can make the learning process more engaging, prevent boredom among students, and make learning more interactive and inspirational (Zahwa et al., 2022).

Teaching basic movement skills to blind students is one of the physical education lessons provided by teachers to students, involving all body parts, with or without equipment, as a way to enhance movement skills, spatial and temporal orientation skills, and to achieve performance (Septiasari, 2021). Basic movement skills include non-locomotor, locomotor, and manipulative skills (Kurniawan et al., 2022; Fitton-Davies et al., 2024). The teaching of basic movement skills involves a series of processes related to training or experience that lead to relatively permanent changes in an individual's ability to perform desired movements effectively (Mahfud & Yuliandra, 2020). Mastery of these basic skills is crucial in achieving sports skills, games, or continuous rhythmic activities. Basic movement skills are foundational for developing various skills in sports and lifelong physical activities. Furthermore, the development of basic movement skills is influenced by maturity, task demands, and environmental factors (Ariyanto et al., 2020). Therefore, each student's learning is not the same as others, but each will have varying abilities (Jariono et al., 2023; Fernanda et al., 2023; Ishar et al., 2023).

Physical education teachers at Special School A (for the blind) generally use audiovisual rhythmic gymnastics as the basic instructional tool for rhythmic gymnastics movements. This shows that teachers primarily utilize communication technology. Previous research Pradana (2019) stated that media development utilizing coral stones with raised paint could improve the basic movements of students by 73.5%. However, that study did not include additional audiovisual aids. Audiovisuals in physical education that only provide limited instruction on movement stages do not offer students the opportunity to innovate in performing movement tasks (Pian et al., 2023; Rustamana, 2023). Trost et al. (2021) mentioned that using digital media for eight weeks could enhance students' motor skills. However, the previous research used the Test of Gross Motor Development 2nd Edition (TGMD02) and was still accompanied by parents, which does not sufficiently allow students to learn independently. The goal of this research is to develop learning media to optimize the basic movement activities of blind students. The novelty of this research is the learning media tailored to the characteristics of blind students, offering movement tasks ranging from easy to difficult. The media is a softbook made from scrap fabric, with movement activity images and motion instructions embroidered in 3D so that blind students can feel them. The softbook is also equipped with audio so that students can listen to the movement instructions in sequence.

Method

This research employed a developmental research type. Developmental research utilizes the ADDIE method, the purpose of which is to develop a media, tool, or learning variation that is used to address learning issues, validate media, and test media effectiveness (Hofhuis et al., 2024). According to Richter et al. (2021) the ADDIE model design includes five stages: first, analysis involves conducting a needs assessment, identifying problems, and analyzing needs. Second, design entails producing a detailed media design. Third, development serves to actualize the media design, validate with experts in adaptive physical education, motor skills, visual impairments, media, and surface design and will test the learning media. Fourth, implementation applies the learning media to effectively conduct physical education. Fifth, evaluation and assessment of the media.

The research instruments include media assessment instruments and basic movement skills instruments. The media assessment instrument is used to determine how suitable the media is for field use, and

it involves collecting scores given by students. There are two instruments required in this research: the media assessment instrument and the basic movement skills instrument. There are also indicators for assessing basic movement activities. This study was conducted at one special education school, SLB A, located in Surabaya, over a period of one month and involved six accompanying sessions. These activities involved five experts in materials and media. The sample for the study included 10 students and 16 classroom teachers (physical education teachers).

The expert instrument includes four indicators with a total of 15 statements. These experts have met the required criteria, including having at least a Master's degree in Physical Education, teaching experience, and a teaching certificate. The instrument has been deemed valid.

Furthermore, the teacher response instrument is filled out after the learning takes place, as teachers can assess how well the learning media was utilized during the teaching process. The teacher response instrument includes two indicators with a total of 14 statements. Three classroom teachers responded to this instrument.

Table 1. Student Response Instrument Grid

Indicator	Statements
Suitability of media	The display of learning media is attractive.
	Learning media is easy to use.
	The instructions contained in the media are easy to understand.
	Learning activities are more fun.
	Learning media can increase learning motivation.
	The media contains interesting material.
	The material is easy to understand.
	The layout and arrangement of the braille letters are correct.
	Attractive design neatness.
	Interesting form of media.
	The language used is easy to understand.
	The letters used are simple and easy to read.

The student response instrument is now completed after the physical education lessons have taken place, as students are able to ascertain that the SORAKDASTRA media is engaging to use during the learning process. Moreover, the media also enhances the learning motivation of blind students. The student response instrument consists of 12 statements, and 10 student respondents filled out this instrument. The students completing this instrument are those who participated in the learning process from the pre-test through to the post-test.

The assessment instrument for student movement activities is completed directly by the classroom teacher (physical education teacher) who supervises the learning process as it occurs. The movement tasks assigned encompass basic movement skills, including non-locomotor, locomotor, and manipulative skills. These basic movement activities are conducted through a circuit training method, where each station includes five movement tasks that must be completed by the students. When a student successfully performs a given movement task, they are awarded a score of 1 for each task completed.

Table 2. Assessment Indicator for Movement Activity

Items	Motion Indicator
1	Non-Locomototive
2	Locomotive
3	Manipulative

Result and Discussion

Result

The assessment was conducted to develop educational media and evaluate its effectiveness in enhancing the learning outcomes of basic movement skills among blind students. The effectiveness of the SORAKDASTRA implementation was gauged using data from pre-tests and post-tests. The test results for the students were used to measure the success rate of implementation for improving basic motor skills of blind students at SLB A, showing a 57% improvement. It was observed that students demonstrated increased activity in movements; they were capable of utilizing the media and performing movements according to the instructions embedded within the SORAKDASTRA media.

This development research yielded a learning media equipped with usage instructions and a module that serves as a reference in the learning process. This media was developed to facilitate classroom teachers (physical education teachers) in teaching blind students at the basic education level, enabling the students to learn independently and enhance their basic movement skills. The stages of Analysis, Design, Development, Implementation, and Evaluation used in this research development can be described as follows:

The first stage is analysis, which identified three main barriers to delivering basic movement content to blind students: the absence of teaching materials (books), learning tools, and specialized physical education media for blind students. This competency analysis was conducted by initially selecting learning materials that align with the physical education curriculum for children with special needs (blind), and by understanding the characteristics and capabilities of the students to develop relevant learning media (Payanti, 2022). Furthermore, the analysis of facilities and infrastructure was conducted at one of the SLB A

schools in Surabaya. Physical education naturally aims to guide blind students, who have sensory limitations, in enhancing their movement skills, physical fitness, social skills, attitudes, and emotional stability, as per the Core Competencies (KI) in the 2013 curriculum. One of the essential materials found in the Basic Competencies (KD) allows blind students to understand and perform variations of basic movement skills, including non-locomotor, locomotor, and manipulative movements (Ciremay & Kartiko, 2020). The results from this facilities and infrastructure analysis indicated that some of the equipment used for sports learning was already available. However, there were still many facilities and infrastructures that were not owned by SLB A school, which greatly supports the development of the SORAKDASTRA media in the school through the circuit training method.

The second stage is design. In this stage, the development of the SORAKDASTRA module, media, and tools involved a design process. This included designing a lesson plan according to the needs of the 2013 curriculum and various media elements by gathering supporting materials such as images, animations, sounds, and videos. This collection could be done in various ways, such as sourcing from the internet or creating the media themselves. Subsequently, the framework of the media, assessment instruments, and preparation of circuit training equipment were also developed (Jatmiko et al., 2020).

The third stage is the development phase. In this stage, materials and teaching aids are gathered, and sourced from the Physical Education, Sports, and Health textbook for elementary grades 1 and other books relevant to the content that will be included in the SORAKDASTRA module and media. SORAKDASTRA comprises three components: the SORAKDASTRA softbook, SORAKDASTRA Circuit Training, and SORAKDASTRA tools. Within the SORAKDASTRA softbook media, there are various features including play, pause, start, next, back, volume up, volume down, and embroidered braille text providing motion instructions. The images of basic motor activity movements are made from scrap fabric, and there are buttons that can produce sounds of movement. The circuit training involves various combinations of movement exercises tailored to the difficulty level of basic movement skills for blind students, consisting of three stations: station 1 for non-locomotor, station 2 for locomotor, and station 3 for manipulative movements. The equipment used in the SORAKDASTRA includes: at station 1, a SORAKDASTRA soft book and five hula hoops; at station 2, four cones, one bell; and station 3, one sound ball, two soccer goals, one elastic band, ropes, buckles, four cones, and one hula hoop.

Figure 1. Media learning design of SORAKDASRTRA

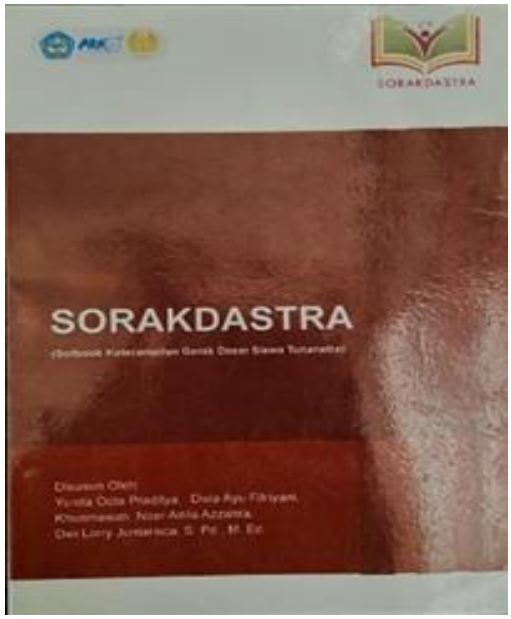

Figure 2. SORAKDASTRA learning module

The development of the SORAKDASTRA learning media through circuit training has undergone a validity trial phase which included evaluations by experts in adaptive physical education, motor skills, visual impairment, media, and surface design. The results of the expert evaluations can be found in Table 3.

Table 3. Percentage of SORAKDASRA Development Results

Test Subject	Validity Result	Percentage Qualification
Adaptive Physical Evaluation	98.6 %	Very Good
Motor skills evaluation	97.3%	Very Good
Visual Impairment Evaluation	98.6%	Very Good
Media Evaluation	94.6%	Very Good
Surface Design Evaluation	85.3%	Very Good

The fourth stage is the implementation phase. Before implementing with students, an expert evaluation was conducted to gather responses from

specialists in adaptive physical education, motor skills, visual impairment, media, and surface design. This evaluation focused on the attractiveness and feasibility of the learning media. The implementation results included validations from these experts in their respective fields. The learning media trials included: 1) individual trials involving 16 classroom teachers (physical education teachers), and 2) trials with 10 students from grades IV, V, and VI. The SORAKDASTRA media trial was conducted over one month, with six accompanying sessions. The success of the SORAKDASTRA implementation was measured using pre-test and post-test data. The test results for the students were used to measure the success rate of implementation for improving the basic motor skills of blind students at SLB A, showing an improvement of 31.84%. Students demonstrated increased movement activity, were able to use the media, and performed movements according to the instructions embedded within the SORAKDASTRA media.

Figure 3. Student trial

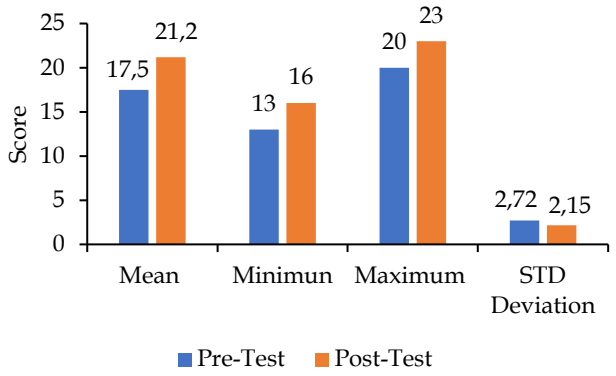

Figure 4. Graph of learning outcome improvement

Based on the data above, the test results for basic movement skills of blind students indicate that if all indicators are met, the score achieved is 24. The average pre-test score is 17.5, and the average post-test score is 21.2. The minimum pre-test score is 13, and the minimum post-test score is 16. The maximum pre-test score is 20, and the maximum post-test score is 23.

Table 4. Normality Test

Score	Skill Test	
	Significant (Sig)	Distributed
Pre-Test	0.055	Normal
Post-Test	0.014	Abnormal

Based on the results of the data processing for the basic movement skills test for BLIND students, the pre-test results show a value of 0.00 > 0.05, indicating that the data is normally distributed. However, the post-test results show a value of 0.01 < 0.05, indicating that the data is not normally distributed. The non-normal distribution of the post-test data is caused by significant differences in the scores, which can lead to a non-normal distribution. Therefore, since one set of data is not normally distributed, the next step is to use a non-parametric test.

Table 5. Homogeneity Test

Score	Skill Test	
	Significant (Sig)	Distributed
Pre-Test and Post Test	0.222	Homogenous
Conclusion	Sig >0.05 which means homogeneous	

Based on the results above, the basic movement skills of blind students in the 10 samples show that the pre-test and post-test results have a significance value (Sig) greater than 0.05, indicating that the data is homogeneous.

Table 6. Wilcoxon Test on Basic Movement Skills

Score	Skills
Negative Ranks	0.00
Positive Ranks	5.50
Z	2,831
Sig (2-tailed)	0.005

Based on the data processing results of the Wilcoxon test, it can be seen that the Sig (2-tailed) value for the basic movement skills test is 0.005. Therefore, it can be interpreted that the hypothesis (H1) is accepted and the null hypothesis (H0) is rejected because Sig < 0.05. This indicates that there is an improvement in the learning outcomes of non-locomotor, locomotor, and manipulative basic movement skills among the students at SLB A.

Table 7. N-Gain Test Percent

Score	Percent
Skill	57%

The basic movement skills of the students increased by 57%, indicating that the N-Gain score results fall into the category of fairly effective.

The fifth stage is evaluation. Based on the evaluation of the implementation of learning using the

SORAKDASTRA media, the following issues were identified: the battery of the media does not last long, the audio volume is too low for outdoor use, the braille embroidery is not sufficiently raised, making it difficult for blind students to read, and the zigzag walking tool used in circuit training is not supportive for learning.

This research successfully designed a learning media in the form of a softbook for teaching basic movement skills to blind students for each movement task. The advantages of this media can be seen in several aspects, including the media features of various movement tasks, and the circuit training tools used in the learning process. The first advantage is the feature that allows for easy learning of basic movement skills by pressing the button corresponding to the material to be learned. Additionally, there are circuit training tools to support basic movement learning activities. Each station has different movement skill tasks and repetitions for each movement. This allows students to perform movements multiple times within a single physical education session. The movements in the circuit training include Non-Locomotor (shaking the head, swinging the arms, bending the body, tiptoeing, and standing on one leg), Locomotor (crawling, walking zigzag, running, jumping, and jumping jacks), and Manipulative (throwing the ball, dribbling and kicking the ball, pulling elastic bands, playing with a hula hoop, and using battle ropes).

The implementation of the SORAKDASTRA media in physical education at one SLB A in Surabaya began with a socialization session on how to use the media for teachers, making it easier for them to assist students in learning activities. During the physical education lessons, the teacher acted as the instructor while the researcher observed the learning process. During the first session, the researcher introduced the media to the students and conducted a pre-test on basic movement skills, as the students had not been previously exposed to the SORAKDASTRA media. In the second and third sessions, students received treatment by trying each station, starting from the easiest (station 1) to the most difficult (station 3), with prepared movement tasks tailored to their needs. The next step was to conduct a post-test, aiming for students to learn the skills independently without teacher assistance by reading or listening to instructions from the SORAKDASTRA media and then performing the movements. After the learning process was completed, the next stage involved providing a student response instrument, assisted by the accompanying teacher.

Discussion

Adaptive physical education is a comprehensive system designed to address and solve issues within the psychomotor domain (Aree-Ue et al., 2022). Adaptive Physical Education also aims to serve children with special needs, possessing a holistic nature similar to that of physical education for typical children (Haris et al., 2021; Lo & Li, 2023). In line with national guidelines, the goals of physical education include the development of physical fitness, individual motor skills, critical thinking skills, social skills, reasoning, moral actions, healthy lifestyles, emotional stability, and an understanding of a clean environment. Additionally, physical education aligns with the term "human movement," as physical activity serves as a comprehensive developmental tool (Ariestika et al., 2021; Hananingsih & Imran, 2020). One of the core subjects in physical education at SLB A is basic movement skills, with sports activities conducted using equipment tailored to each station and level of difficulty.

In general, physical education utilizes learning media as an aid during the teaching and learning process (Gray et al., 2023). Learning media can be defined as anything that helps an individual understand or learn a theory or material, useful for training abilities or skills that assist the learning process (Rianto et al., 2022). Consistent with these views, learning media is one of the tools provided by teachers to achieve learning objectives (Eliyantika et al., 2022). The function of learning media is to attract students' interest and increase their engagement, which can enhance learning outcomes. Additionally, it reinforces and clarifies specific topics presented by the teacher (Mukarromah et al., 2021).

This research indicates that teachers and students at SLB A urgently need physical education learning media for basic movement skills that are suited to the characteristics of the students. Generally, the SORAKDASTRA (softbook) media includes various features such as music, narration, and sound effects, along with an appealing visual presentation (Setyawan & Kusuma, 2023). The media developed in this research is technology-oriented, providing a more comprehensive learning experience. With this technology, teachers can create a more dynamic learning environment and utilize the senses that are still functioning well in blind students (Nadine & Yuliana, 2023).

According to data, the effective reading speed (KEM) of blind children in braille ranges from 85 to 101 words per minute (WPM), compared to 250 to 325 WPM for sighted children. The median comparison of KEM between blind and sighted children is 93:287.5, indicating that blind children read at about one-third the speed of their sighted peers (Arwana, 2022). This condition should not reduce the right of blind children to access information. Therefore, text literacy intervention for blind children is crucial. In response, this research utilizes the SORAKDASTRA media to

package physical education information effectively for blind students.

Conclusion

Based on the results of the research and development, it can be concluded that SORAKDASTRA, developed through circuit training, was created following all stages of the ADDIE development model. According to the expert validations, it can be stated that the basic movement skill tasks oriented towards physical education learning now adhere to the principles, theories, and practices of physical education. The SORAKDASTRA media, focused on basic movement skill learning, is greatly needed by both teachers and students at SLB A to provide non-locomotor, locomotor, and manipulative movement tasks. Furthermore, the developed SORAKDASTRA learning media is validated and deemed suitable for use in education, thereby facilitating the learning process and helping to improve the basic movement skills of blind students.

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Conceptualization; Y. O. P.; methodology.; D. L. J.; validation; F. G. A. P.; formal analysis; F. G. A. P.; investigation.; Y. O. P.; resources; D. L. J.; data curation: F. G. A. P; original draft writing: Y. O. P.; review and editing: Y. O. P.; visualization: D. L. J. All authors have read and approved the published version of the manuscript.

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The authors declare that there is no conflict of interest regarding the publication of this paper.

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