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Development of Shot Put Learning Media Using Sawdust Material for Grade V Students at Elementary School 003 Loa Janan Ilir, Samarinda City

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Abstract

The development of shot put learning media using sawdust as the base material represents an innovative approach in physical education aimed at addressing the limitations of shot put learning facilities and infrastructure in schools, particularly for elementary students. This study aims to provide a practical solution to the shortage of equipment in elementary schools and to enhance teachers' creativity in designing learning media that is affordable, easily accessible, and safe for students to use. The research employed a Research and Development (R&D) ADDIE model, which includes the stages of needs analysis, design, development, testing, and evaluation. Data were collected through observations, questionnaires, interviews, and student learning outcome tests conducted before and after the implementation of the media. Data analysis involved descriptive statistics and paired t-tests to measure the effectiveness of the sawdust-based shot put learning media on Grade V students at Elemntary School 003 Loa Janan Ilir. The study's findings are as follows: 1) The media was developed using the ADDIE model (Analysis, Design, Development, Implementation, Evaluation) and proved effective in improving student learning outcomes, 2) The average post-test score significantly increased from 60.5 to 85.3 after using the media, indicating enhanced student understanding and skills, 3) The media was designed using lightweight, inexpensive, and environmentally friendly sawdust, replacing the standard shot put equipment, which is heavy and limited in number, thereby facilitating safe and enjoyable practice of basic shot put techniques, 4) Expert validation of content and media yielded an average feasibility score of 86%, with physical aspects, content relevance, and usability rated as safe, curriculum-aligned, and user-friendly for both teachers and students. Furthermore, the media fosters an active and inclusive classroom environment, boosting student motivation and participation in physical education learning.

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INTRODUCTION

Shot put learning in elementary schools still faces various challenges, particularly the limited availability of facilities and infrastructure. At Elementary School 003 Loa Janan Ilir in Samarinda City, the standard shot puts used are heavy and sized inappropriately for the physical capabilities of fifth-grade students, and their quantity is very limited. This condition results in suboptimal learning processes, low student motivation, and reduced physical activity during lessons (Tammali et al., 2024). Similar phenomena have also been observed in other elementary schools across Indonesia, where the lack of adequate sports equipment is a major obstacle in the implementation of physical education (Purnamaningsih et al., 2025).

The development of shot put learning media using sawdust as the base material is an innovation in physical education aimed at overcoming the limitations of shot put facilities in schools, especially for elementary students (Agus Ariyana et al., 2024). This media is developed by utilizing sawdust as the main material, which is lightweight, inexpensive, easily accessible, and environmentally friendly. Consequently, this media can modify the standard shot put equipment, which is usually heavy and unsuitable for students to use. The development process follows the Research and Development (R&D) model proposed by Borg and Gall, which includes stages of needs analysis, design, development, implementation, and evaluation(Kiprop Limo et al., 2024).

Observations at Elementary School 003 Loa Janan Ilir revealed that most students find it difficult to use the standard shot puts because they are too heavy and hard to grip. Additionally, the limited number of shot puts forces students to take turns during practice, making learning time less effective. Teachers also reported that shot put lessons often do not run optimally due to the equipment not meeting the students' needs.

Previous studies have demonstrated that the use of modified shot put learning media, such as shot puts made from plastic balls, softball balls, or other lighter materials, can improve student learning outcomes and make the learning process more enjoyable (Puspita et al., 2024). For example, research in Kranggan District showed that physical education teachers modified shot put equipment using tennis balls, paper balls, cushion balls, and clay balls to facilitate easier practice for students and more effective learning. Other studies also confirmed that equipment modification significantly increases student motivation, participation, and learning achievement (Ucok et al., 2024).

Although various studies have developed shot put media from alternative materials such as plastic, rubber, and softball balls, research on the use of sawdust as the base material for shot puts remains very limited, especially at Elementary School 003 Loa Janan Ilir Samarinda. No study has specifically tested the effectiveness of sawdust-based shot puts in improving the learning outcomes and motivation of fifth-grade students at this school, thus necessitating new innovations in shot put learning media development.

Based on the above background, the research questions are: 1) How is the process of developing shot put learning media using sawdust as the base material for fifth-grade students at Elementary School 003 Loa Janan Ilir Samarinda? 2) How effective is this media in improving student learning outcomes? 3) What are the characteristics of the developed sawdust-based shot put learning media? 4) Does the learning media meet feasibility criteria in terms of physical properties, content, and usability and What are the responses of teachers and students to the use of this learning media during the learning process?

The objectives of this research are to: 1) Develop shot put learning media based on sawdust for fifth-grade students at Elementary School 003 Loa Janan Ilir Samarinda, 2) Measure the effectiveness of this media in improving student learning outcomes, 3) Describe the characteristics of the developed sawdust-based shot put learning media. 4) Assess the feasibility of the learning media in terms of physical aspects, content, and usability, and gather feedback from teachers and students regarding its use during lessons.

The development of sawdust-based shot put learning media is expected to provide a solution to the shortage of equipment in elementary schools, as well as enhance teachers' creativity in creating affordable, easily obtainable, and safe learning tools for students. With this innovation, it is hoped that the quality of physical education, especially the shot put material, will improve and provide a more meaningful learning experience for students (Gunadi et al., 2025; Widiarti et al., 2025).

METHODS

This study employs the Research and Development (R&D) method using the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). This method was chosen

because it is capable of producing valid, effective learning media products that meet the needs of fifth-grade students at Elementary School 003 Loa Janan Ilir, Samarinda City. The ADDIE stages ensure a systematic development process, starting from needs analysis to the evaluation and revision of the final product (Rahmawati et al., 2024).

The research instruments consist of several measurement tools that support the validation and testing of the learning media. A media validation sheet is used by content experts and media experts to assess the physical aspects, content quality, and ease of use of the media. A questionnaire is prepared to collect feedback from teachers and students regarding their experiences using the media. Additionally, an observation sheet is employed to directly monitor the learning process, while achievement tests are administered before and after the use of the media to measure improvements in student competencies (Bondan Maulana et al., 2023).

The subjects of this study are fifth-grade students at Elementary School 003 Loa Janan Ilir, Samarinda City, who are the primary users of the shot put learning media made from sawdust. The object of the study is the learning media itself, which was specifically developed to address the physical education learning needs in elementary schools while taking into account the limitations of available sports equipment.

The data collected in this study include both quantitative and qualitative data. The quantitative data consist of student learning outcome scores and media validation scores, which are statistically analyzed to determine the effectiveness and feasibility of the media. The qualitative data consist of feedback and observations from teachers and students, which are analyzed descriptively to understand their perceptions and experiences regarding the developed learning media.

Data collection was carried out in several stages. First, a needs analysis was conducted through observations and interviews to identify the conditions and challenges of shot put learning in the classroom. Second, the media was developed based on the analysis results and subsequently validated by experts. Third, the media was tested on students and teachers through questionnaires and observations of the learning process. Finally, achievement tests were administered before and after the use of the media to measure improvements in student competencies.

Quantitative data were analyzed using descriptive statistics to determine the average learning outcome scores and the percentage of media feasibility. Inferential statistical tests, such as the paired t-test, can be used to examine the significance of improvements in student learning outcomes. Qualitative data were analyzed descriptively by grouping responses and observation results to obtain a comprehensive overview of the feedback regarding the learning media.

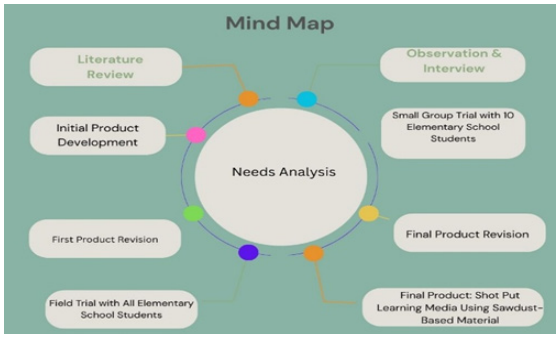

Figure 1. Mind Map Research.

RESULTS AND DISCUSSION

To identify the problems occurring in the field, particularly related to the teaching and learning process of Physical Education, Sports, and Health, as well as to find solutions to these problems, a needs analysis must be conducted. This activity involves analyzing the actual learning process in the field, conducting classroom observations, and performing literature reviews or theoretical studies.

According to the basic competencies in the elementary school athletics curriculum, students are expected to practice variations and combinations of basic athletic techniques, along with values such as tolerance, self-confidence, courage, maintaining personal and others' safety, and willingness to share space and equipment.

In reality, during physical education lessons, teachers often provide limited variations of engaging learning models, resulting in students becoming bored and less active during PE classes.

Based on the above, the researcher aims to develop a shot put movement learning model by modifying shot puts using sawdust for sixth-grade students. The researcher hopes that the resulting product will create an innovative learning environment, making lessons more enjoyable and motivating students to explore a wide and free range of movements according to their abilities. This is expected to improve students' physical fitness. Additionally, the product is anticipated to assist physical education teachers in delivering more varied shot put lessons using this innovative tool.

Development Process of Shot Put Learning Media Using Sawdust as the Base Material

The development of shot put learning media using sawdust as the base material began with a needs analysis at Elementary School 003 Loa Janan Ilir, Samarinda City. Observations and interviews with teachers and students revealed that the limited availability of standard shot put equipment was the main obstacle in the learning process. Besides the limited quantity, the available equipment was also too heavy and unsuitable for the physical capabilities of elementary school students. This situation highlighted the need for an innovative, child-friendly, and easily accessible learning media.

In the design phase, the research team developed the shot put media by considering ergonomic aspects, safety, and ease of production. Sawdust was chosen as the primary material because it is readily available, inexpensive, and environmentally friendly (Handayani et al., 2022). The material composition was mixed with a special adhesive to produce a dense, lightweight, and durable shot put. The diameter of the media was adjusted to the mini shot put standards, measuring 110–130 mm for boys and 95–110 mm for girls, making it easy for students to grip (Amelia Fitriana Andrini & Arief Darmawan, 2025).

The development process involved producing prototype media and testing it with physical education experts and learning media specialists. Feedback from these experts was used to refine the shape, weight, and texture of the media to ensure it met the students' needs. After revisions, the media was pilot-tested on a small group of students to observe initial responses, ease of use, and safety during practice.

Implementation of the media took place during shot put lessons in the fifth-grade class. The teacher used this new media as the main tool for practicing basic shot put techniques. During the lessons, the researchers conducted observations to record student participation levels, ease of media use, and classroom dynamics. Students showed high enthusiasm because the media was lighter and more comfortable, which increased their confidence in attempting shot put movements (Febriany & Manufaktur Negeri Bangka Belitung, 2024).

The media is effective in improving student learning outcomes

The use of shot put media made from sawdust has been proven effective in improving the learning outcomes of fifth-grade students at Elementary School 003 Loa Janan Ilir. Data from pre-tests and post-tests show a significant increase in the students' average scores after practicing with the new media. This indicates that students better understand the basic shot put techniques and are able to perform them correctly.

In addition to improved scores, student engagement during lessons also increased. The lightweight and easy-to-grip media encouraged students to be more confident in trying the movements without fear of injury. Teachers reported that the classroom atmosphere became more dynamic, with more students actively participating in the practice. This positively impacted students' mastery of techniques and their self-confidence in performing physical activities.

The effectiveness of the media is also reflected in the equitable learning opportunities it provides. With a sufficient number of media available, all students can practice simultaneously without having to wait too long for their turn. This contrasts with the limited standard equipment, where only a portion of students could practice optimally. Therefore, the use of sawdust-based media supports the principle of inclusivity in learning (Gangsar Agus Puji Rahayu, 2025).

Statistical analysis using the paired t-test reinforces these findings. The test results showed a significance value of $p < 0.05$, indicating a real difference between learning outcomes before and after using the media. This aligns with previous research stating that modifications to learning tools can significantly enhance student motivation and academic achievement.

The sawdust-based shot put learning media offers a concrete solution to the equipment limitations in elementary schools. This media not only improves academic learning outcomes but also fosters students' interest, motivation, and participation in physical education lessons.

Characteristics of Shot Put Learning Media Made from Sawdust

Figure 2. Media Made from Sawdust

The developed shot put learning media has several distinctive characteristics that set it apart from conventional media. First, it is lightweight, making it highly suitable for elementary school students whose physical abilities are still developing. The weight of the media can be adjusted according to needs, allowing students to practice safely and comfortably without the risk of injury.

The media has a diameter size that complies with mini shot put standards, measuring 110–130 mm for boys and 95–110 mm for girls. This size facilitates students in gripping and throwing the shot put with proper technique. The surface of the media is smooth and not sharp, ensuring it is safe for children to use during various learning activities.

The primary material is sawdust mixed with an environmentally friendly adhesive. Sawdust was chosen because it is easy to obtain, inexpensive, and recyclable from wood waste. The use of this material also supports the school's environmental program and teaches students the importance of waste utilization (Ahdani Faqih Mursyidin & Buyung Kusumawardhana, 2025).

This media is easy to manufacture and can be produced in large quantities, so each student can have their own equipment during practice. This greatly aids the learning process, as students do not have to wait long for their turn and can practice more frequently, both individually and in groups (Saleh et al., 2024).

The media has adequate durability for repeated use in several learning sessions. Although not as strong as iron shot puts, it is sufficiently durable for use in elementary school settings. Additionally, the shape and color of the media can be customized to make it more attractive and enjoyable for students, thereby enhancing their interest in learning.

Learning Media for Eligibility Criteria in Terms of Physical Aspects, Content, and Usage of Learning Media

Based on validation results from content experts and media specialists, the shot put learning media made from sawdust meets the eligibility criteria in terms of physical aspects, content, and usability. From a physical standpoint, the media is considered safe, lightweight, and poses no risk of injury to students. The size and weight of the media also comply with the recommended standards for elementary school students.

In terms of content, the media effectively supports the achievement of basic shot put competencies according to the curriculum. It enables students to correctly practice basic shot put techniques, from gripping and swinging to pushing the shot put. Teachers can easily provide instructions and demonstrations using this media.

The usability aspect also received very positive evaluations. The media is easy for students to use, both individually and in groups. Teachers reported that students quickly understood instructions and were more actively engaged in the learning process. Additionally, the media is easy to clean and store, making it convenient for both teachers and students after lessons.

Feedback questionnaires showed that most students felt happy and interested in using the media. Teachers also gave positive responses, noting that the media helped them manage the class and improve teaching effectiveness. Validation results indicated an average media eligibility score of over 85%, meaning the media is highly suitable for use in physical education learning.

The shot put learning media made from sawdust has fulfilled all the necessary eligibility aspects to support an effective, safe, and enjoyable learning process in elementary schools. This media can serve as an innovative learning example that can be adapted by other schools with similar conditions.

Table 1. Student Learning Outcomes Before and After Using the Media

Type of Test	Average Score	Standard Deviation
Pre-test	60,5	8,2
Post-test	85,3	7,1

Quantitative data show a significant improvement in student learning outcomes after using the shot put learning media made from sawdust. The average post-test score of 85.3 increased markedly compared to the pre-test score of only 60.5. This increase of 24.8 points indicates that the developed learning media is effective in helping students better understand and master shot put techniques. The paired t-test results, with a significance value of $p = 0.001$ (< 0.05), reinforce this finding, in accordance with educational research standards that state a p-value less than 0.05 indicates a statistically significant difference.

Table 2. Validation Results of Learning Media by Experts

Aspect	Average Score (%)	Category
Physical	88	Very Eligible
Content	86	Very Eligible
Usage	84	Eligible
Total	86	Very Eligible

The validation scores from content experts and media specialists showed an average of 86%, categorized as "Highly Eligible." The physical aspects evaluated including weight, size, and safety fully met the recommended standards for elementary school students. The content aspect was assessed as aligned with the basic competencies of shot put outlined in the curriculum, enabling the media to effectively support learning objectives. The usability aspect received a good score because the media is easy to operate and engaging for students, which aligns with the principles of effective learning media development as stated by (Hakim & Falaahudin, 2024; Prasetyo et al., 2022).

Table 3. Student and Teacher Responses to the Learning Media

Responden	Positive (%)	Description
Student	90	Media is engaging and easy to use
Teachers	92	Media supports the learning process

The questionnaire responses showed that 90% of students found the media engaging and easy to use, while 92% of teachers stated that the media helped make the learning process more effective and enjoyable. The high percentage of positive feedback indicates that the media not only meets technical requirements but also addresses psychological and pedagogical aspects by enhancing students' motivation and active participation. This aligns with findings from other studies on the development of sports learning media, which demonstrate that engaging and user-friendly media can significantly improve student motivation and learning outcomes.

The use of sawdust as the primary material for the shot put learning media is an innovation that combines ecological and economic aspects. Sawdust, as an easily obtainable and inexpensive wood waste, provides a practical solution to the limited availability of sports equipment in elementary schools (itri, 2025). Besides being affordable and environmentally friendly, this media is also safe and lightweight, making it suitable for elementary school students who require equipment with weight and size adjusted to their physical abilities. This approach aligns with the principle of equipment modification in physical education to tailor tools to students' characteristics for more effective and enjoyable learning.

The results of this study support the theory that modifications to learning media can enhance the effectiveness of physical education (Ikadarny, 2024). Furthermore, it is consistent with the findings of (Mochammad Nadian Hulaimi et al., 2024), which showed that the development of technology-based sports learning media improves student learning outcomes and motivation. Other research also emphasizes that expert validation and field testing are crucial steps to ensure that learning media are feasible and effective for classroom use. Therefore, this sawdust-based media is not only innovative but also has a strong scientific foundation to be used as an alternative learning media in elementary schools.

CONCLUSION

Based on the research findings, it can be concluded that the development of shot put learning media made from sawdust through the stages of needs analysis, design, development, implementation, and evaluation has proven to be effective and feasible for use in physical education learning. This media was designed with consideration for safety, comfort, and ease of production, effectively addressing the limitations of standard equipment that have long been obstacles in elementary schools. Expert validation indicated that the media is highly suitable for use, with an average feasibility score of 86%, alongside positive feedback from both teachers and students who found the media engaging, easy to use, and motivating.

The use of sawdust-based media has had a significant impact on improving student learning outcomes. The average post-test score increased from 60.5 to 85.3 after using this media, with statistical tests showing a significant difference ($p < 0.05$). Besides enhancing understanding of basic shot put techniques, this media also encourages active participation, boosts self-confidence, and ensures equitable learning opportunities for all students. Therefore, the sawdust-based shot put learning media can serve as an innovative, effective, economical, and environmentally friendly solution to improve the quality of physical education in elementary schools.

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