Journal Of Sport Education (JOPE)
Available online on http://jope.ejournal.unri.ac.id/php.index/jope
Volume 7, Number 1, 2024: 81-87
DOI:http://dx.doi.org/10.31258/jope.7.1.81-87

PENGEMBANGAN MEDIA PEMBELAJARAN VIDEO TUTORIAL BERBASIS ANALISIS BIOMEKANIKA PADA TEKNIK SHOOTING PETANQUE

DEVELOPMENT OF VIDEO TUTORIAL LEARNING MEDIA BASED ON BIOMECHANICAL ANALYSIS IN PETANQUE SHOOTING TECHNIQUES

Epenetus Giawa [1*], Benny Aprial. M [2], Liliana Puspa Sari [3], Alan Alfiansyah Putra Karo Karo [4]

[1 2 4] Program Studi Magister Pendidikan Jasmani, Sekolah Tinggi Olahraga dan Kesehatan Bina Guna, Sumatera Utara, Indonesia
[3] Program Studi Sarjana Pendidikan Jasmani Kesehatan dan Rekreasi, Sekolah Tinggi Olahraga dan Kesehatan Bina Guna, Sumatera Utara, Indonesia

Coresponding Author: **Epenetus Giawa, ebengiawa17@gmail.com**

Received: 2024-08-01; Revised: 2024-10-31; Accepted: 2024-11-30

Abstrak

Penelitian ini bertujuan untuk mengembangkan media pembelajaran berupa video tutorial berbasis analisis biomekanika pada teknik shooting petanque sebagai media bantu latihan atlet. Permasalahan yang melatarbelakangi penelitian ini adalah kesulitan atlet dalam memahami dan menerapkan teknik shooting secara benar akibat keterbatasan media pembelajaran yang digunakan dalam proses latihan. Penelitian ini menggunakan metode penelitian dan pengembangan (Research and Development) dengan mengadaptasi model 4D yang meliputi tahap define, design, development, dan disseminate. Instrumen penelitian berupa angket penilaian yang diberikan kepada ahli materi, ahli media, pelatih petanque, dan atlet. Data dianalisis secara deskriptif kuantitatif dan kualitatif. Hasil penilaian menunjukkan bahwa media video tutorial berbasis analisis biomekanika memperoleh kategori baik hingga sangat baik pada aspek materi, pembelajaran, tampilan, dan pemrograman. Penilaian dari atlet juga menunjukkan respons positif terhadap penggunaan media dalam latihan shooting petanque. Dengan demikian, media pembelajaran video tutorial berbasis analisis biomekanika yang dikembangkan dinyatakan layak dan efektif digunakan sebagai media bantu dalam meningkatkan pemahaman teknik shooting petanque.
Kata kunci: video, pembelajaran, biomekanika, petanque

Abstract

This study aims to develop a tutorial video-based learning media using biomechanical analysis for petanque shooting techniques as a training support tool. The background of this research is the difficulty experienced by athletes in understanding and applying proper shooting techniques due to the limited use of instructional media during training sessions. This study employed a Research and Development (R&D) method by adapting the 4D model, which consists of define, design, development, and disseminate stages. The research instruments were assessment questionnaires administered to material experts, media experts, petanque coaches, and athletes. The data were analyzed using descriptive quantitative and qualitative techniques. The results indicate that the developed tutorial video-based learning media achieved good to very good categories in terms of material content, learning aspects, display, and programming. Athlete assessments also showed positive responses toward the use of the media in shooting training. Therefore, the tutorial video-based learning media using biomechanical analysis is feasible and effective as a supporting medium to enhance athletes' understanding of petanque shooting techniques.
Keywords*: video, learning, biomechanics, petanque*

How To Cite: Giawa, E., M, B. A., Sari, L. P., & Karo Karo, A. A. P. (2024). Development of Video Tutorial Learning Media Based on Biomechanical Analysis in Petanque Shooting Techniques. *Journal Of Sports Education (JOPE)*, 7

Copyright © The Author (s) 2024
ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

(1), 81-87. doi:http://dx.doi.org/10.31258/jope.7.1.81-87

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INTRODUCTION

Sports education and training require an effective, systematic, and science-based learning process to continuously improve athletes' performance. Scientifically designed training processes focus not only on repetitive movements but also on understanding the technical principles and physical conditions that support sports skills (Karo-Karo et al., 2024; Nofrizal et al., 2025). A structured learning approach has been proven to improve motor skills and athlete performance in various sports (Pardilla et al., 2025).

One sport that demands precise technical mastery is petanque, particularly shooting, which is a crucial factor in competition success. Petanque shooting requires coordination of movement, precise throwing angle, strength, and consistency of movement to accurately hit the target (Nofrizal et al., 2025; Ramadhan & Pardilla, 2025). Accuracy in shooting technique is strongly influenced by motor skills, movement control, and an understanding of body mechanics during the throw (Dedi Nofrizal et al., 2025).

In practice, petanque training is still largely dominated by conventional methods, such as live demonstrations by coaches without the support of adequate learning media. This method often makes it difficult for athletes to fully grasp the details of movements, especially when performed quickly and complexly (Sihotang et al., 2025; Karo-Karo et al., 2024). As a result, athletes' understanding of the technical stages is suboptimal and potentially leads to repeated movement errors during training (Pardilla et al., 2025).

These limited learning media impact the low effectiveness of training, particularly in understanding biomechanical aspects of movement such as body position, arm swing, balance, and ball release angle. Yet a detailed understanding of movements is essential for athletes to be able to make technique corrections independently and continuously (Ningrum et al., 2022; Dedi Nofrizal et al., 2025b). Without the support of appropriate media, the process of internalizing technique is less than optimal and tends to rely entirely on coach instructions (Syamsuyurnita et al., 2025).

The use of video tutorial-based learning media is a relevant solution to support sports training. Video media has the advantage of presenting movements visually, allowing for replay, and displaying technical details through adjusting the viewing angle and movement speed (Karo-Karo et al., 2024; Pardilla et al., 2025). Furthermore, the use of video media has proven effective in improving students' and athletes' understanding of movement concepts and motor skills in various sports learning contexts (Nainggolan et al., 2025).

The integration of biomechanical analysis into video tutorials adds value to the training process because athletes not only imitate movements but also understand the principles of scientifically correct movement. Biomechanical analysis helps explain the relationship between body movement and the laws of mechanics, allowing technical errors to be identified and corrected early in training (Ramadhan & Pardilla, 2025; Dedi Nofrizal et al., 2025). In the context of petanque shooting techniques, biomechanical analysis plays a crucial role in explaining movement effectiveness through observation of body position, balance, coordination, and ball release angle (Nofrizal et al., 2025).

The application of video tutorial-based learning media equipped with biomechanical analysis is expected to improve the quality of training and athletes' understanding of petanque shooting techniques more comprehensively. This media can be an effective tool for coaches and athletes in optimizing the training process, increasing time efficiency, and minimizing repeated technical errors (Pardilla et al., 2025; Sihotang et al., 2025).

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Based on these issues, the development of innovative, effective learning media tailored to the needs of petanque training is necessary. Therefore, this study aims to develop video tutorial learning media based on biomechanical analysis of petanque shooting techniques that are suitable for use as training aids for athletes.

METHOD

This research employed a research and development (R&D) method. The development model adopted the 4D model, which consists of four stages: define, design, develop, and disseminate. This model was chosen because it is systematic and appropriate for producing learning media products suitable for use in sports training.

Figure 1. Development Steps

The define stage was conducted to analyze petanque shooting training needs through observation and identification of problems in the field. This stage revealed that athletes were having difficulty understanding shooting techniques correctly, and training was not supported by adequate learning media. The design stage involved compiling petanque shooting technique materials, complemented by biomechanical analysis, developing video scenarios, and determining the presentation flow of the video tutorial. The development stage included the production of the video tutorial, validation by subject matter and media experts, and product revisions based on suggestions and input. The dissemination stage involved disseminating the video tutorial for use in petanque training.

The research subjects consisted of subject matter experts, media experts, petanque coaches, and athletes. The subject matter experts and media experts assessed the appropriateness of the content and presentation of the media, while the coaches and athletes assessed the practicality and usefulness of the media for petanque shooting training. The research instrument used was an assessment questionnaire with a rating scale covering aspects of the material, learning, presentation, and programming of the media.

Table 1. Aspects and Indicators for Assessing Video Tutorial Media

No.	Assessment Aspects	Indicators
1	Learning Materials	Suitability of shooting techniques, completeness of material, presentation sequence
2	Display	Clarity of purpose, ease of understanding, usefulness
3	Programming	Visual quality, shooting angle, clarity of movement
4	Assessment Aspects	Video flow, ease of use, editing quality

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Data analysis techniques used were descriptive quantitative and qualitative. Quantitative data were obtained from the scores of validators and respondents, then converted into feasibility categories. Qualitative data, in the form of suggestions and comments, were used as the basis for improving and refining the biomechanical analysis-based video tutorial learning media.

Table 2. Media Assessment Score Conversion Categories

Score Range	Category
3,26 – 4,00	Excellent
2,51 – 3,25	Good
1,76 – 2,50	Fair
1,00 – 1,75	Poor

RESULTS

This research resulted in a video tutorial learning media product based on biomechanical analysis of petanque shooting techniques. The developed media was validated and assessed by subject matter experts, media experts, petanque coaches, and athletes to determine its suitability as a training aid.

Table 3. Recapitulation of Overall Media Assessment Results

Appraiser	Average Score	Category
Materials Expert	2,9	Good
Media Expert	2,8	Good
Coach	3,0	Very Good
Athlete	3,0	Good

The assessment results show that the video tutorial learning media based on biomechanical analysis of petanque shooting techniques is in the good to very good category and is suitable for use as a training aid.

DISCUSSION

The development of video tutorial learning media based on biomechanical analysis of petanque shooting techniques aims to provide effective, systematic, and tailored training aids tailored to athletes' needs. Assessments by subject matter experts indicate that the material aspect is in the very good category, while the learning aspect is in the good category. These findings indicate that the petanque shooting technique material presented aligns with sports training principles and athletes' needs, is structured coherently, and is easy to understand. Quality learning media must present material accurately, relevantly, and align with learning objectives to optimally support motor skill development (Setiawan, 2023; Sesanti et al., 2023; Kartika et al., 2022).

Assessments by media experts indicate that the display aspect is in the good category and the programming aspect is in the very good category. This demonstrates that the visual quality, presentation flow, and video editing process meet the criteria for effective learning media. Video tutorial media allows athletes to observe movements in greater detail through adjusting shooting angles, using slow motion, and clear visual presentation. The advantages of visual media play a crucial role in helping users understand detailed techniques and reducing movement misperceptions (Setiawan, 2023; Sesanti et al., 2023; Yani & Kamal, 2026).

Assessments from petanque coaches indicate that video tutorials are rated good to excellent in terms of both content and learning. Coaches consider these media to be practical to

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use as training aids and capable of explaining the stages of petanque shooting techniques in greater detail than conventional demonstration methods. Learning media in sports training serves as a supporting tool to clarify instructions, increase training time efficiency, and maintain consistency in delivering material to athletes (Kartika et al., 2022; Sari et al., 2024; Yani & Kamal, 2026).

Athletes' responses to the use of video tutorials are categorized as good, with a positive average score. Athletes find them helpful in understanding petanque shooting techniques because they can learn the movements repeatedly and independently at their own pace. This indicates that video tutorials can increase athletes' motivation, engagement, and active participation in the training process. Active involvement is a crucial factor in learning motor skills, as visual comprehension and repetition of movements contribute to the formation of correct movement patterns (Setiawan, 2023; Sesanti et al., 2023; Ananda et al., 2024).

The integration of biomechanical analysis into video tutorials is a key advantage of the developed product. Biomechanical analysis helps explain the principles of efficient movement based on the relationship between body position, balance, coordination, and ball release angle. By understanding biomechanical aspects, athletes not only imitate movements visually but also understand the scientific basis behind each stage of the movement. This understanding has the potential to improve the quality of petanque shooting technique while minimizing repeated movement errors during practice (Kartika et al., 2022; Setiawan, 2023; Yani & Kamal, 2026).

The results of this study indicate that video tutorials based on biomechanical analysis have a good to excellent level of suitability as a tool for practicing petanque shooting techniques. These findings reinforce the view that utilizing technology-based learning media and a scientific approach can improve the effectiveness of sports training, particularly in mastering complex technical skills. The developed learning media are also relevant to the needs of coaches and athletes in supporting a more modern, efficient, and science-based training process (Sesanti et al., 2023; Sari et al., 2024; Yani & Kamal, 2026).

CONCLUSION

This research produced a learning media in the form of a video tutorial based on biomechanical analysis of petanque shooting techniques developed through a 4D research and development model. Based on the results of assessments by material experts, media experts, coaches, and athletes, the developed media is in the good to very good category in terms of material, learning, display, and programming aspects. This video tutorial media is declared suitable for use as a training aid because it can help athletes understand petanque shooting techniques more clearly, systematically, and based on biomechanical principles. Thus, the use of video tutorial learning media based on biomechanical analysis can be an innovative alternative in supporting the effectiveness of training and improving the quality of petanque shooting techniques.

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