



A BIOMECHANICS-INFORMED MODEL FOR FUTSAL PASSING AND SHOOTING TECHNIQUE TRAINING: RELEVANCE FOR HIGH SCHOOL AND VOCATIONAL STUDENTS

Sugiyanto Fajar Purnama

Department of Sports Science, Postgraduate Program, SebelasMaret University (UNS), Indonesia

Abstract

This study presents a biomechanics-informed model for training passing and shooting techniques in futsal, tailored for high school and vocational students. Futsal, a variant of soccer played indoors, demands precise passing and shooting skills due to its fast-paced nature and limited playing space. Drawing upon biomechanical principles, this model integrates insights from studies on human movement mechanics to optimize passing and shooting performance in futsal. Key components of the model include body positioning, foot placement, kinetic chain activation, and follow-through mechanics. By applying biomechanical principles to technique training, high school and vocational students can enhance their passing and shooting proficiency in futsal, thereby improving overall game performance and enjoyment.

Keywords

Biomechanics, Futsal, Technique training, Passing, Shooting, High school students, Vocational students.

INTRODUCTION

Futsal, a fast-paced indoor variant of soccer, requires players to possess exceptional passing and shooting skills due to the confined playing space and quick transitions inherent to the game. High school and vocational students engaging in futsal often seek to enhance their technical proficiency to excel in both recreational and competitive settings. Understanding the biomechanical principles underlying passing and shooting techniques can significantly contribute to the development of effective training models tailored to the needs of these students.

The purpose of this study is to introduce a biomechanics-informed model for passing and shooting technique training in futsal, specifically designed for high school and vocational students. By integrating insights from biomechanics research with practical application in futsal training, this model aims to provide students with a structured framework to optimize their passing and shooting performance on the court.

Biomechanics, as applied to sports, involves the analysis of human movement mechanics to enhance athletic performance and reduce the risk of injury. In the context of futsal, biomechanical principles play a crucial role in understanding the optimal body positioning, footwork, and kinetic chain activation required for effective passing and shooting.

The proposed model encompasses key elements of passing and shooting techniques, emphasizing the importance of proper body alignment, foot placement, weight transfer, and follow-through mechanics. By incorporating biomechanical insights into technique training, students can develop a deeper understanding of the mechanical principles governing their movements and refine their skills accordingly.

Moreover, the relevance of this model extends beyond skill development to encompass injury prevention and performance optimization in futsal. By adhering to biomechanically sound movement patterns, students can mitigate the risk of overuse injuries and enhance their overall athletic performance on the court.

In summary, this study aims to bridge the gap between biomechanical research and practical application in futsal training for high school and vocational students. By introducing a biomechanics-informed model for passing and shooting technique training, educators and coaches can empower students to elevate their futsal skills, maximize performance potential, and foster a deeper appreciation for the science behind athletic movement.

METHOD

The development process of the biomechanics-informed model for futsal passing and shooting technique training involved a systematic and iterative approach aimed at creating a comprehensive framework relevant to high school and vocational students. Initially, a thorough review of existing literature on biomechanics in sports, specifically focusing on soccer and futsal, provided foundational insights into the key principles underlying passing and shooting techniques. Subsequently, biomechanical analyses were conducted using advanced technologies such as high-speed video analysis and motion capture to dissect the kinematics and kinetics involved in futsal movements. Expert consultation with professionals in sports biomechanics, futsal coaching, and athletic training enriched the model by incorporating practical insights and refining its applicability to real-world training scenarios. Practical application of the model involved designing structured training sessions integrating specific drills and exercises aimed at improving passing and shooting proficiency among students. Throughout this process, quantitative performance metrics and qualitative feedback were collected to evaluate the effectiveness and relevance of the model. The iterative nature of model development ensured continuous refinement based on empirical observations and stakeholder input, resulting in a tailored training framework aligned with biomechanically sound principles and conducive to the needs of high school and vocational students aiming to excel in futsal.

The development of the biomechanics-informed model for futsal passing and shooting technique training

involved a systematic approach that combined literature review, biomechanical analysis, expert consultation, and practical application.

Initially, a comprehensive review of existing literature on biomechanics in sports, particularly soccer and futsal, was conducted to identify key principles and factors influencing passing and shooting techniques. This literature review provided the theoretical foundation for understanding the biomechanical aspects of futsal movements and informed the development of the training model.

Next, biomechanical analysis was employed to examine the kinematics and kinetics of passing and shooting actions in futsal. High-speed video analysis, motion capture technology, and force plate analysis were utilized to assess the biomechanical variables involved in these techniques, including body positioning, joint angles, force production, and energy transfer.

Expert consultation played a crucial role in validating the biomechanical insights and refining the training model. Experts in sports biomechanics, futsal coaching, and athletic training provided valuable feedback and recommendations based on their practical experience and scientific knowledge. Their input helped ensure the applicability and effectiveness of the model in real-world training settings.

Practical application of the model involved designing and implementing structured training sessions aimed at improving passing and shooting techniques among high school and vocational students. These training sessions incorporated specific drills, exercises, and feedback mechanisms aligned with the biomechanics-informed principles outlined in the model.

Quantitative and qualitative data were collected during the training sessions to evaluate the effectiveness of the model in enhancing passing and shooting performance among students. Performance metrics such as accuracy, velocity, and consistency were measured, while qualitative feedback from participants and coaches provided insights into the perceived utility and impact of the training model.

The iterative nature of the model development process allowed for continuous refinement and optimization based on empirical observations and feedback from stakeholders. This iterative approach ensured that the training model remained responsive to the needs and preferences of high school and vocational students while adhering to biomechanically sound principles.

Overall, the methodological approach employed in developing the biomechanics-informed model for futsal passing and shooting technique training integrated theoretical knowledge, practical expertise, and empirical evidence to create a comprehensive and effective training framework tailored to the needs of high school and vocational students.

RESULTS

The implementation of the biomechanics-informed model for futsal passing and shooting technique training yielded promising results among high school and vocational students. Quantitative assessments revealed significant improvements in passing accuracy, shooting velocity, and overall technique proficiency following the structured training sessions. Participants demonstrated enhanced body positioning, foot placement, and follow-through mechanics, indicating a deeper understanding and application of biomechanically sound principles in futsal techniques.

Qualitative feedback from students and coaches corroborated the positive outcomes observed during training. Participants reported increased confidence, improved spatial awareness, and a greater sense of control over their passing and shooting actions on the court. Coaches noted enhanced teamwork, communication, and strategic decision-making among players, contributing to more cohesive and effective gameplay during futsal matches.

DISCUSSION

The results of this study underscore the efficacy and relevance of integrating biomechanical principles into futsal passing and shooting technique training for high school and vocational students. By emphasizing proper body alignment, joint mechanics, and kinetic chain activation, the model enabled students to optimize their movement patterns and enhance their technical proficiency in futsal. The systematic approach to training fostered a deeper understanding of the biomechanical factors influencing passing and shooting performance, empowering students to make informed adjustments and refine their skills accordingly.

Furthermore, the positive outcomes observed in this study highlight the transferability of biomechanics-informed training principles to real-world futsal contexts. Beyond improving individual technique, the model facilitated greater collaboration, synchronization, and strategic execution among players, ultimately enhancing team performance and competitiveness on the court.

CONCLUSION

In conclusion, the biomechanics-informed model for futsal passing and shooting technique training offers a valuable framework for high school and vocational students seeking to elevate their performance in futsal. By integrating biomechanical insights into training practices, educators and coaches can empower students to develop sound technical foundations, optimize their movement efficiency, and excel in competitive futsal environments. Moving forward, continued research and implementation of biomechanically informed training models hold great promise for enhancing athletic development and fostering a deeper understanding of sports performance among high school and vocational students in futsal and other sports disciplines.

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