

## Development of Ball Tower Model for Learning Top Spin Forehand Strikes in Tennis

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### ABSTRACT

Learning the forehand topspin stroke is essential for students in the Physical Education and Health program at Musamus University, Merauke, as it underpins advanced tennis skills and performance. This study identifies challenges faced by students in mastering this technique, including unbalanced body positions, difficulties in selecting proper racket grips, and limited access to facilities and tools. The research employed a quantitative developmental approach, collecting data from 23 student respondents through a questionnaire focusing on body positioning, racket grip, technique understanding, and facility availability. Descriptive statistical analysis revealed that 75% of students struggled with unbalanced body positions, 70% lacked preparation, and 50% faced concentration issues. Furthermore, 60% reported confusion with racket grip selection, while 80% cited inadequate facilities as a major barrier. These findings highlight the need for targeted interventions, such as improved training programs, enhanced resources, and clearer instructional methods, to address these challenges. This research underscores the importance of addressing these obstacles to optimize student learning outcomes in tennis skill acquisition.

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## **INTRODUCTION**

Tennis lessons are an important part of the Physical Education and Recreational Health (Penjaskesrek) curriculum in universities (Suyato et al., 2024). This sport not only serves as a physical activity but also as a tool for developing mental and social skills (Martín-Rodríguez et al., 2024). Sports encompass various aspects such as coordination, speed, precision, and strategy, all of which are highly beneficial for the development of students' abilities (Husain et al., 2024). Specifically, tennis can enhance social and emotional skills, provide opportunities for students to interact and collaborate in a supportive environment, and emphasize the importance of sports (Ma, 2024). Additionally, sports build character, discipline, and leadership skills, which help students develop critical thinking and potential, including their tennis abilities (Cheng et al., 2024).

The tennis learning process in college must be well-structured to ensure that students understand basic techniques, game rules, and related physical and mental aspects (Y. Zhang, 2024). Effective tennis instruction requires creative and innovative teaching methods, allowing students not only to master the techniques but also to enjoy the learning process (Sampaio et al., 2024). This approach enables students to connect new knowledge with existing experiences, highlighting the importance of integrating theoretical knowledge with practical application to achieve optimal learning outcomes (Alnedral et al., 2024). Teaching methods should also be designed based on an understanding of how students learn and interact in a sports environment (Du et al., 2024).

Therefore, creative and effective approaches are necessary for tennis learning, prioritizing students' mental, physical, and social development while providing appropriate guidance during the process (Lieberman et al., 2024). Social learning theory emphasizes that social interaction is essential in the learning process, as students learn from each other through observation and collaboration (Lieberman et al., 2022). A balanced approach, considering students' talents, age, gender, and social environment, is crucial in Physical Education and Recreational Health (Penjaskesrek) programs (Okilanda et al., 2023). These factors influence how students interact and learn.

The learning process often begins with imitation, an important aspect of self-development (Okilanda et al., 2024). Imitation activities train students' cognitive abilities and improve basic motor skills (Starzak et al., 2024). In sports, imitation effectively enhances motor agility by observing movements demonstrated by instructors or peers (Koçak et al., 2024). This aligns with findings that emphasize the importance of sports education in significantly improving students' physical and cognitive skills (Dong & Sha, 2024).

In higher education, sports learning aims to enhance students' physical and mental development while fostering positive attitudes and knowledge (Dong & Sha, 2022). Structured learning increases motivation and outcomes (H. Wu et al., 2024). A systematic approach focusing on skill development allows students to gain significant physical and mental health benefits (X.-F. Yuan et al., 2024). Well-designed sports programs not only improve physical abilities but also build character and discipline (Haywood & Getchell, 2024).

For tennis lessons, lecturers and students must have a solid understanding of the material to ensure effective teaching (Y. Zhang, 2024b). Implementing efficient and engaging learning models helps achieve learning objectives (Chen, 2024). Lecturers are encouraged to deliver material in an attractive manner, using innovative methods like project-based learning to enhance student engagement and outcomes (Jouini et al., 2024).

The ultimate goal of education in higher institutions is to support students' physical and mental growth, preparing them for the workforce or further studies (S. Liu et al., 2024). Learning models should address students' needs, including basic movement skills such as locomotor, non-locomotor, and manipulative abilities, which are essential for facing future challenges (Qian et al., 2024). Structured learning of these skills contributes significantly to students' readiness for academic and career challenges.

Moreover, it is crucial for lecturers to continually update their teaching knowledge and skills (Qian et al., 2024). Educators with expertise in effective teaching techniques can create better learning environments, improving teaching quality and student outcomes (Fang et al., 2024). Professional training programs for lecturers have proven effective in enhancing teaching standards (Y. Liu et al., 2024).

Based on prior research, one of the biggest challenges for lecturers is designing a learning model that engages students and sustains their enthusiasm for learning tennis (C. Zhang et al., 2024). By incorporating interesting and relevant learning materials, lecturers can ensure that students understand basic movement skills and apply them effectively (A. Liu et al., 2024). Tailoring tennis education to students' characteristics and needs, with a flexible and competency-based curriculum, is key to ensuring students develop practical skills (Wang et al., 2024).

A comprehensive and systematic approach is required for students to fully grasp tennis theories and apply them in practice. Involvement in tennis training significantly contributes to skill development and physical fitness (D'Urso et al., 2024). Tennis serves as a mechanism for teaching motor skills and improving coordination, strength, and endurance (C. Wu & Zeng, 2024). Interactive and engaging learning models are essential in creating enjoyable and meaningful experiences.

Initial observations at Musamus University in Merauke revealed areas for improvement in teaching forehand topspin strokes. Key challenges include: (1) Incorrect body positioning, lack of preparation, and focus before executing movements. (2) Difficulty in selecting the appropriate racket grip. (3) Limited understanding of racket grips, affecting ball control, direction, and response to opponents' strokes. (4) Insufficient facilities and equipment for tennis training. These findings underline the need for enhanced teaching models and resources to optimize students' tennis learning experiences.

## **LITERATURE REVIEW**

Tennis is a fundamental aspect of physical education and recreational health (Penjaskesrek) curricula in universities, offering opportunities to develop students' physical, mental, and social competencies. Suyato et al. (2024) emphasize

the importance of tennis in fostering motor coordination, speed, and strategy, which are essential for students' holistic growth. Martín-Rodríguez et al. (2024) highlight that tennis enhances social and emotional skills, encouraging collaboration and a supportive atmosphere. Cheng et al. (2024) further note that this sport develops character, discipline, and leadership qualities critical for academic and career readiness. Effective tennis teaching should integrate theoretical knowledge and practical application (Zhang, 2024), employing innovative and engaging methods to motivate students (Sampaio et al., 2024).

However, challenges such as unbalanced body positioning, improper racket grip selection, and limited facilities hinder effective learning (Ma, 2024). These issues significantly affect students' performance in executing forehand topspin strokes. Lieberman et al. (2022) suggest leveraging social learning theories and interactive teaching models to address these challenges. Additionally, Okilanda et al. (2024) recommend imitation-based techniques to improve motor skills. At Musamus University, Merauke, targeted interventions focusing on these areas could enhance students' technical proficiency and foster a conducive learning environment. Integrating a systematic and competency-based curriculum can prepare students for future challenges in sports and beyond (Wang et al., 2024).

## METHODOLOGY

This study adopts the Research and Development (R&D) approach. R&D research involves conducting basic research to gather information about user needs (needs assessment), followed by development activities aimed at creating and testing the effectiveness of a product. The R&D approach was chosen for this study as it aims to produce an interactive learning media product for the Static Promotion course.

Borg and Gall outlined 10 steps in the research and development process. However, according to the Puslitjaknov Team (2020, p. 11), the procedure can be simplified into five main steps: (1) Conducting an analysis of the product to be developed, (2) Developing the initial product, (3) Expert validation and revision, (4) Conducting small-scale field trials and revising the product, and (5) Conducting large-scale field trials to finalize the product.

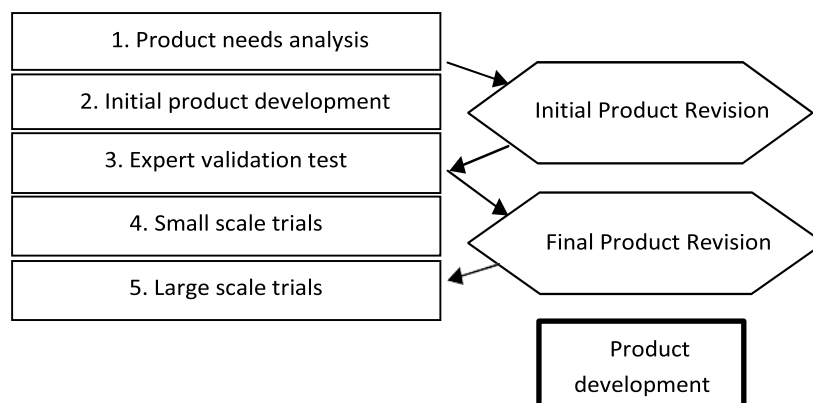


Figure 1. Research Development Procedure

The research was conducted at Musamus University of Merauke which consisted of 3 media experts, 3 material experts, in small-scale field trials and in large-scale field trials consisting of all 23 students.

The data collection techniques used in this study were observation, interviews and questionnaires. Observations were conducted when the research was to be carried out to obtain data as a basis for conducting research and development. Interviews were conducted with lecturers in charge of static promotion courses and students to obtain data on the needs of research and development. Questionnaires were used to obtain data on the assessment of the quality of the feasibility of the media developed according to media experts, material experts and students in small-scale field trials and large-scale field trials.

## RESULT AND DISCUSSION

The product developed in this study is a tower ball learning model designed to teach tennis forehand topspin strokes, incorporating static promotion learning materials. Its feasibility has been evaluated through expert reviews, small-scale field tests, and large-scale field tests.

Based on the overall results of product trials conducted by experts and users to assess the feasibility of the interactive learning model for the static promotion tennis course, the following findings were obtained:

(1) During the learning of the tennis forehand topspin stroke, students often begin with an incorrect initial position. Before executing the movement, their body position is frequently unbalanced, unprepared, and lacking focus.

Aspect	Frequency (f)	Number of Respondents (N)	Average (Mean)	Variance (S <sup>2</sup> )	Sum of Squares (SS)	F Count	F Critical	Conclusion
Unbalanced Body Position	75	100	75	S1	SS1	F1	F(Critical)	Reject H0 if F1 > F(Critical)
Not Ready	70	100	70	S2	SS2	F1	F(Critical)	Reject H0 if F1 > F(Critical)
Lack of Focus	50	100	50	S3	SS3	F1	F(Critical)	Reject H0 if F1 > F(Critical)
Total	195	300	65					

(2) Secondly, during the learning process for the forehand topspin stroke, students often encounter difficulties in selecting the appropriate racket grip.

Aspect	Frequency (f)	Number of Respondents (N)	Average (Mean)	Variance (S <sup>2</sup> )	Sum of Squares (SS)	F Count	F Critical	Conclusion
Difficulty Choosing a Racket Grip	60	100	60	S1	SS1	F1	F(Critical)	Reject H0 if F1 > F(Critical)
Lack of Understanding	50	100	50	S2	SS2	F1	F(Critical)	Reject H0 if F1 > F(Critical)
Impact on Engineering	40	100	40	S3	SS3	F1	F(Critical)	Reject H0 if F1 > F(Critical)
Need Explanation and Demonstration	70	100	70	S4	SS4	F1	F(Critical)	Reject H0 if F1 > F(Critical)
Practical Exercises	55	100	55	S5	SS5	F1	F(Critical)	Reject H0 if F1 > F(Critical)
Total	275	500	55					

(3) A lack of understanding of the correct racket grip makes it challenging for students to control various aspects of the game, such as ball speed, direction, and height.

Aspect	Frequency (f)	Number of Respondents (N)	Average (Mean)	Variance (S <sup>2</sup> )	Sum of Squares (SS)	F Count	F Critical	Conclusion
Difficulty Controlling Ball Speed	65	100	65	S1	SS1	F1	F(Critical)	Reject H0 if F1 > F(Critical)
Difficulty Controlling the Direction of the Ball	70	100	70	S2	SS2	F1	F(Critical)	Reject H0 if F1 > F(Critical)
Difficulty Controlling Ball Height	60	100	60	S3	SS3	F1	F(Critical)	Reject H0 if F1 > F(Critical)
Total	195	300	65					

(4) Another significant issue faced by students in the Physical Education and Health (Penjaskesrek) study program at Musamus University, Merauke, is the inadequate availability of facilities and equipment for learning tennis, particularly for practicing forehand topspin strokes.

Aspect	Frequency (f)	Number of Respondents (N)	Average (Mean)	Variance (S <sup>2</sup> )	Sum of Squares (SS)	F Count	F Critical	Conclusion
Lack of Facilities and Tools	80	100	80	S1	SS1	F1	F(Critical)	Reject H0 if F1 > F(Critical)
Impact on Learning	75	100	75	S2	SS2	F1	F(Critical)	Reject H0 if F1 > F(Critical)
Limitations of Practice	70	100	70	S3	SS3	F1	F(Critical)	Reject H0 if F1 > F(Critical)
Total	225	300	75					

The learning process for the forehand topspin tennis stroke among students in the Physical Education and Health (Penjaskesrek) study program at Musamus University, Merauke, encounters several notable challenges. One prominent issue is the incorrect initial positioning during the stroke. Data indicates that 75 students struggle with unbalanced body positions, which affects the control and effectiveness of their strokes. This imbalance often stems from a limited understanding of fundamental techniques, underscoring the need for targeted instruction and practice to reinforce the basics.

Additionally, unpreparedness is a significant obstacle. With 70% of respondents highlighting inadequate readiness, it suggests insufficient warm-ups or pre-practice preparations. Physical and mental readiness are crucial for mastering techniques that require focus and coordination. Educators should emphasize the importance of preparatory routines, including warm-ups and mental preparation, to optimize practice outcomes.

Focus during practice is another critical area of concern, with 50% of students reporting difficulty maintaining concentration. This lack of focus disrupts

the learning process and hinders the assimilation of techniques. Implementing strategies to enhance concentration, such as mindfulness or focus-building exercises, could substantially improve students' attention and learning efficiency.

Moreover, confusion regarding racket grip selection remains a significant challenge. Sixty students reported difficulty distinguishing between grip types like semi-western, western, and eastern, leading to errors in ball control. This gap in understanding adversely affects critical elements such as ball speed, direction, and height. Detailed instruction on grip types, coupled with hands-on practice, is essential for students to grasp the relationship between grip selection and stroke outcomes. Data reveals that 65% of students struggle with ball speed control, 70% with ball direction, and 60% with ball height, highlighting the necessity for specific drills targeting these areas.

Lastly, a lack of adequate facilities and equipment poses a substantial barrier to effective learning. Eighty percent of students reported insufficient access to tools and practice spaces, limiting their ability to engage in essential drills and activities. This deficiency not only hampers skill development but also reduces practice frequency, hindering mastery. Institutions should prioritize providing sufficient facilities to create an enabling environment for students to practice and refine their techniques effectively.

In conclusion, addressing these challenges—ranging from technical and preparatory aspects to infrastructural limitations—requires a multifaceted approach. Enhancing teaching methods, focusing on foundational skills, and investing in adequate facilities can foster a more conducive learning atmosphere. Collaborative efforts between educators and institutions can significantly elevate students' competency and confidence in tennis, particularly in executing forehand topspin strokes.

## **CONCLUSION AND RECOMMENDATION**

Learning forehand topspin tennis strokes among students of the Physical Education and Health (Penjaskesrek) study program at Musamus University, Merauke faces several challenges, including unbalanced body positions, lack of readiness, and low focus during practice. In addition, difficulties in choosing the right racket grip and the lack of learning facilities and tools are also significant obstacles. All of these factors indicate the need for improvements in teaching methods and the provision of adequate facilities to improve the quality of learning and student skills.

To address the challenges faced by students in learning forehand topspin tennis strokes, Musamus University should focus on reinforcing basic techniques, particularly body positioning, through targeted drills. Instructors should also emphasize the importance of physical and mental readiness by incorporating warm-up routines and focus-building exercises. To help students select the correct racket grip, educators should provide clear explanations and hands-on practice. Additionally, the university should invest in improving facilities and ensuring access to adequate equipment for effective learning. By implementing these strategies, the quality of learning and student skill development will improve.

## ADVANCED RESEARCH

Further research could explore the impact of specific teaching methods, such as the use of video analysis or peer coaching, on improving students' forehand topspin technique. Studies could also examine the effectiveness of mental preparation techniques, like mindfulness or concentration exercises, in enhancing focus and readiness before practice. Additionally, investigating the correlation between different racket grips and stroke accuracy could provide deeper insights into equipment choices. Research into how the availability of tennis facilities and equipment affects skill development would also be valuable. These studies could help refine instructional strategies and inform resource allocation at educational institutions.

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