



Development of a Control Technique Skills Training Model in Futsal Games for PJKR Students of the 2024 Class at Tadulako University, Palu City

Moh. Aimar Wirzat^{1A-E*}, Tri Murtono^{2B-D}, Rivalwan^{3B-D}, Addriana Bulu Baan^{4B-D}

^{1,2,3,4} Universitas Tadulako, Sulawesi Tengah, Indonesia

mohaimarwirzat@gmail.com^{1*}, murtono_tri@yahoo.co.id², rivalwan@untad.ac.id³,
addriana.palu@gmail.com⁴

ABSTRACT

This study aimed to develop and validate a control technique skills training model in futsal for PJKR students of the 2024 cohort at Tadulako University, Palu City. Controlling, particularly sole control, is a fundamental technical component in futsal that significantly influences ball possession, transition speed, and tactical effectiveness in open-skill game situations. The research employed a Research and Development (R&D) approach based on the Borg and Gall model, consisting of ten systematic stages: identification of potential and problems, data collection, product design, design validation, revision, small-scale trials, revision, large-scale trials, final revision, and product finalization. Data were collected through interviews, questionnaires, and structured observations to ensure conceptual and empirical validation of the developed model. Expert validation indicated that the product met usability standards with minor revisions. Empirical testing showed that the small-group trial achieved a feasibility percentage of 82%, while the large-group trial reached 81%, both categorized as "appropriate for use." The findings demonstrate that the developed training model effectively enhances students' understanding and practical skills in applying control techniques in futsal. The study concludes that the proposed model is pedagogically feasible, practically applicable, and capable of supporting evidence-based futsal learning and training in higher education contexts.

ARTICLE HISTORY

Received: 2026/01/31
Accepted: 2026/02/16
Published: 2026/02/21

KEYWORDS

Control Technique,
Futsal Training Model,
Research and Development,
Motor Learning;
Physical Education.

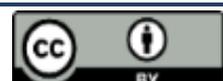
AUTHORS' CONTRIBUTION

- Conception and design of the study;
- Acquisition of data;
- Analysis and interpretation of data;
- Manuscript preparation;
- Obtaining funding

Cites this Article : Wirzat, M.A.; Murtono, T.; Rivalwan, R.; Baan, A.B. (2026). Development of a Control Technique Skills Training Model in Futsal Games for PJKR Students of the 2024 Class at Tadulako University, Palu City. **Competitor: Jurnal Pendidikan Kepeleatihan Olahraga**. 18 (1), p.0962-0970

INTRODUCTION

The development of futsal over the past decade has shown significant growth at the regional, national, and international levels (Dhae et al., 2023). In Indonesia, futsal has become one of the most popular sports among school and university students due to its fast-paced, dynamic nature, and easy accessibility through inter-school and inter-university competitions (Novriansyah et al., 2023). This popularity not only impacts participation but also demands improved technical skills for players, particularly at the higher education level, which prepares future sports educators and coaches.



Characteristically, futsal is an open-skill sport that demands rapid motor adaptation to constantly changing stimuli (Isyamahendra & Kafrawi, 2022). The game takes place in confined spaces at high intensity, requiring players to possess quick decision-making skills, precise movements, and effective team coordination (Amarta & Nugroho, 2022). Recent sports science literature shows that in modern futsal, successful offensive and defensive transitions are heavily influenced by efficient and stable mastery of basic techniques under pressure (Sarmiento et al., 2018; Travassos et al., 2020; Ribeiro et al., 2021).

One fundamental technique that significantly determines game performance is ball control. Performance analysis studies show that over 70–80% of technical actions in futsal involve a combination of passing and controlling (Ridwan et al., 2022; Gómez et al., 2019). Inaccurate control increases the risk of losing the ball, slows transitions, and reduces the effectiveness of team strategies (Hasibuan, 2018; Naser & Ali, 2016). In the context of modern futsal, played on a flat field with a low-bounce ball, sole control techniques are very dominant because they allow for quick and efficient ball stabilization (Hasan, 2019; Toha, 2020).

However, a preliminary study of Physical Education, Health, and Recreation students from the class of 2024 showed that conceptual understanding and practical mastery of sole control techniques remain low. As many as 53.3% of students had not yet mastered optimal foot control techniques, 60% had difficulty performing control movements using the soles of their feet, and 60% had never participated in systematic control technique development training. These findings indicate a gap between the performance demands of modern futsal and the quality of basic technique learning in higher education settings.

This issue is crucial because physical education students are not only players but also future educators and coaches. Limitations in mastery and training models for control techniques have the potential to reduce the quality of knowledge transfer in the future.

Recent research in futsal has focused heavily on technical-tactical performance analysis, physiological load, and game-based learning approaches (Clemente et al., 2019; Travassos et al., 2020; Gómez et al., 2019). Performance analysis studies have shown that attacking effectiveness is significantly influenced by the quality of the first touch and initial ball control (Ribeiro et al., 2021; Sarmiento et al., 2018). A stable first touch allows for accelerated transitions, increased space for movement, and optimized tactical decisions.

In the context of biomechanics and motor learning, controlling with the sole of the foot offers advantages in terms of increased contact surface area and postural stability when receiving a high-speed ball (Ali et al., 2018; Aquino et al., 2020). Neuromuscular studies also confirm that ball control involves complex coordination between the proprioceptive system, dynamic balance control, and reactive responses to opponent pressure (Paul et al., 2021; Loturco et al., 2019).

Research on the development of technical training models in futsal is growing, particularly through small-sided games, constraint-led approaches, and game-based training (Clemente et al., 2019; Ometto et al., 2018). These approaches have been shown

to improve situational adaptation and decision-making speed. However, most research focuses more on tactical and physical aspects than on developing specific models of structured and progressive foot control techniques.

In sports research and development (R&D), development models based on Borg & Gall and ADDIE have been widely used to develop valid, practical, and effective training products (Sugiyono, 2020; Dwiyoogo, 2018). Research and Development studies in sports show that systematically developed training models can significantly improve technical skills compared to conventional training (Pratama et al., 2021; Hidayat et al., 2022).

Therefore, conceptually and empirically, mastery of controlling techniques—particularly sole control—has a strong theoretical basis from the perspectives of performance analysis, motor learning, biomechanics, and modern sports pedagogy.

Although international literature has discussed the importance of first touch and ball control in futsal, several significant research gaps remain.

First, most research focuses on match analysis and elite performance, rather than on developing basic technique training models for physical education students. Second, existing research tends to integrate ball control within a general game context, without developing specific sole control training modules based on the characteristics of modern futsal pitches. Third, there are few R&D studies that explicitly develop and test control training models based on a systematic approach with expert validation and effectiveness testing in the Indonesian higher education context.

Furthermore, preliminary studies indicate student misconceptions regarding the variety of control techniques and a lack of structured training experience. This suggests that the futsal practice curriculum still requires innovation in training models that are more contextual, progressive, and standardized.

Therefore, there is an urgent need to develop sole control-based control training models that are systematically designed, expertly validated, and empirically tested for effectiveness.

Based on these problems and gaps, this study aims to develop a valid, practical, and effective futsal control training model for Physical Education, Health, and Recreation students. This model was designed using a systematic research and development approach, encompassing needs analysis, model design, expert validation, limited trials, and effectiveness evaluation.

The novelty of this research lies in: (1) Development of a specific sole control training model based on biomechanical characteristics and the demands of modern futsal, (2) Integration of motor learning and game-contextual training approaches in a single structured training package, (3) Empirical validation through effectiveness testing on improving students' control abilities, and (4) Contribution to strengthening the futsal practice curriculum in higher education based on evidence-based training models.

Theoretically, this research enriches the study of sport pedagogy and skill acquisition in futsal. Practically, the research results are expected to serve as a reference for lecturers, coaches, and educational institutions in developing futsal technique learning that is more systematic and adaptive to the demands of the modern game.

METHODS

This study uses a Research and Development (R&D) approach, aiming to develop a valid, practical, and effective futsal sole control training model for the 2024 intake of Physical Education (PJKR) students at Tadulako University, Palu City. The R&D approach was chosen because it allows for a systematic process, from needs analysis to product effectiveness testing, as recommended in the development of modern sports learning models (Sugiyono, 2019; Dwiyoogo, 2018). This model refers to the Borg & Gall framework, modified into eight main stages: (1) needs analysis, (2) model design planning, (3) initial product development, (4) expert validation, (5) revision I, (6) small-scale trials, (7) revision II, and (8) large scale trials.

Conceptually, the development of this training model is based on motor learning theory, the principles of the constraint-led approach, and a game-based training approach that emphasizes adaptation to real-world game situations (Clemente et al., 2019; Ometto et al., 2018; Travassos et al., 2020). Recent literature shows that game-based training design significantly improves technical skill acquisition and decision-making compared to traditional methods (Ribeiro et al., 2021; Sarmiento et al., 2018). Therefore, each stage of product development integrated the principles of progression, meaningful repetition, and simulated game stress (Aquino et al., 2020; Loturco et al., 2019).

The research was conducted over two months in the Physical Education, Health, and Recreation (PJKR) Study Program, Tadulako University. The study population was all PJKR students from the class of 2024. The sampling technique used purposive sampling, with the following criteria: (1) active PJKR students from the class of 2024, (2) interest and basic experience in futsal, and (3) willingness to participate in the entire trial series. This technique is appropriate for development research because it considers subject characteristics relevant to the product's objectives (Hardani et al., 2020).

The sample size for the small-scale trial was 10 students and for the large-scale trial was 30 students. This number refers to recommendations for development research in sports education, which emphasizes gradual validation before widespread implementation (Pratama et al., 2021; Hidayat et al., 2022). Product validation was conducted by two sports learning experts and one futsal expert to assess the content, construction, and implementation aspects of the model.

The research instruments included: (1) a rating scale questionnaire for expert validation, (2) an observation sheet on control technique skills, and (3) a questionnaire containing student responses to the model's practicality. Measurement of control technique skills was based on biomechanical indicators of first touch, postural stability, and movement transition effectiveness, as recommended in recent futsal performance studies (Paul et al., 2021; Gómez et al., 2019).

Data analysis was conducted using descriptive quantitative methods using feasibility percentages for validation and trial data. The feasibility interpretation criteria refer to sports learning media development standards, namely: highly feasible ($\geq 85\%$), feasible (70–84%), moderately feasible (55–69%), and less feasible ($< 55\%$). Effectiveness data was analyzed by comparing the increase in skill scores before and after model implementation, in line with evaluation practices in sports skill acquisition research (Ribeiro et al., 2021).

The results of the analysis at each stage were used as the basis for product revisions until a standardized, applicable, and evidence-based control technique training model was obtained. Methodologically, this approach ensures that the final product is not only conceptually valid but also empirically effective in improving the controlling skills of PJKR students.

Table 1.
Percentage Classification

No	%	Classification	Meaning
1	80%-100%	80%-100%	Used
2	60%-79%	60%-79%	Used
3	50%-59%	50%-59%	Replaced
4	< 50%	< 50%	Replaced

RESULTS AND DISCUSSION

Result

Phase 1 Trial Result Data (Small Scale)

The variables used in the observation of the development of the control skills training model in futsal, according to the evaluation of the first phase (small group) trial, are presented in tabular form as quantitative data. The complete data are as follows:

Table 2.
Phase 1 Trial Results (Small Scale)

NO.	ASPECT	SCORE		%
		X	Xi	
1.	What do you think about the exercise in picture 1 that you have done?	36	40	90%
2.	In your opinion, how did you carry out the exercise in Figure 1?	36	40	90%
3.	In your opinion, is the exercise in picture 1 that you have done useful in playing Futsal?	36	40	90%
4.	What do you think about the exercise in picture 2 that you have done?	19	40	48%
5.	In your opinion, how do you carry out the exercise in Figure 2?	22	40	55%
6.	In your opinion, is the exercise in picture 2 that you have done useful in playing Futsal?	24	40	60%
7.	What do you think about the exercise in picture 3 that you have done?	32	40	80%
8.	In your opinion, how do you carry out the exercise in Figure 3?	36	40	90%
9.	In your opinion, is the exercise in picture 3 that you have done useful in playing Futsal?	36	40	90%
10.	What do you think about the exercise in Figure 4 that you have done?	39	40	98%
11.	In your opinion, how do you carry out the exercise in Figure 4?	30	40	75%
12.	In your opinion, is the exercise in picture 4 that you have done useful in playing Futsal?	39	40	98%
13.	What do you think about the exercise in Figure 5 that you have done?	36	40	90%
14.	In your opinion, how do you carry out the exercise in Figure 5?	30	40	75%
15.	In your opinion, is the exercise in picture 5 that you have done useful in playing Futsal?	39	40	98%
Amount		490	600	82%

Trial Result Data (Large Scale)

The variables used in the observation of the control training model in futsal, according to the evaluation of the second phase of the trial (large group), are presented in a table as quantitative data. The complete data is as follows:

Table 3.
 Phase 2 Trial Results (Large Scale)

NO.	ASPECT	SCORE		%
		X	Xi	
1.	What do you think about the exercise in picture 1 that you have done?	113	120	94%
2.	In your opinion, how did you carry out the exercise in Figure 1?	107	120	89%
3.	In your opinion, is the exercise in picture 1 that you have done useful in playing Futsal?	120	120	100%
4.	What do you think about the exercise in picture 2 that you have done?	51	120	43%
5.	In your opinion, how do you carry out the exercise in Figure 2?	66	120	55%
6.	In your opinion, is the exercise in picture 2 that you have done useful in playing Futsal?	83	120	69%
7.	What do you think about the exercise in picture 3 that you have done?	96	120	80%
8.	In your opinion, how do you carry out the exercise in Figure 3?	108	120	90%
9.	In your opinion, is the exercise in picture 3 that you have done useful in playing Futsal?	107	120	89%
10.	What do you think about the exercise in Figure 4 that you have done?	99	120	83%
11.	In your opinion, how do you carry out the exercise in Figure 4?	107	120	89%
12.	In your opinion, is the exercise in picture 4 that you have done useful in playing Futsal?	108	120	90%
AMOUNT		1165	1440	81%

The results of the trial with the 2024 intake of PJKR students also showed that this training model was well-received. In the first phase of the trial (small group), the percentage was 82%, while in the second phase (large group), the percentage was 81%, both of which were in the "used" category. These results indicate that the control training model is able to improve students' understanding and skills in implementing control techniques in futsal.

Discussion

The development of a futsal control technique training model for the 2024 Physical Education and Training (PJKR) students was implemented using the systematic and step-by-step Borg and Gall procedure. This approach aligns with research and development practices in modern sports education, which emphasize multilevel validation before widespread implementation (Sugiyono, 2019; Dwiyoogo, 2018). Conceptually, the developed model integrates motor learning principles, specifically repetitive contextual practice and variability of practice, which have been proven effective in improving first-touch stability in open-skill sports like futsal (Clemente et al., 2019; Travassos et al., 2020).

Initial validation results by two futsal experts and one learning expert showed a score of 50–60% (categorized as usable). Although categorized as "suitable for use with revision," these findings indicate that the initial product still requires refinement in terms of training structure, load progression, and alignment with the biomechanical characteristics of controlling using the soles of the feet. Futsal performance literature shows that first-touch quality is significantly influenced by body position, foot contact angle, and postural stability when receiving the ball (Gómez et al., 2019; Paul et al., 2021). Therefore, product revisions focused on strengthening the technical components and integrating game-based drills.

After improvements based on expert input, small-group trials yielded a feasibility rate of 82% and a large-group trial of 81% (categorized as usable/feasible). This percentage represents a significant improvement compared to the initial validation

results and indicates that the training model meets the practicality and implementation requirements on the field. Empirically, game-based training approaches have been shown to increase the effectiveness of technical skill acquisition compared to conventional drilling methods (Ometto et al., 2018; Ribeiro et al., 2021). The model developed in this study applies these principles through a variety of situational drills, rapid transitions, and simulated opponent pressure.

From a sports performance analysis perspective, control is a key component in maintaining ball possession and accelerating attacking transitions (Sarmiento et al., 2018; Naser & Ali, 2016). Recent neuromuscular research also confirms that repetition-based control training can significantly improve intermuscular coordination and proprioceptive responses (Loturco et al., 2019; Aquino et al., 2020). Student questionnaire results indicated an improvement in technical control skills after implementing the model, consistent with the theory that progressive and structured training improves movement efficiency and first-touch consistency (Paul et al., 2021).

In addition to improving technical skills, this model also contributed to the affective aspects of learning. Students reported reduced boredom due to the more interactive variety of training. This finding aligns with sports pedagogy studies that suggest that training variation and a contextual approach increase intrinsic motivation and learning engagement (Clemente et al., 2019; Hidayat et al., 2022). In the context of higher education, this is crucial because PJKR students are not only required to master skills but also to understand evidence-based practice training design.

Overall, the improvement in results between small and large group tests demonstrates consistent implementation of the developed training model. Therefore, the development of this control technique model is not only methodologically sound but also empirically relevant in improving the basic controlling skills of PJKR students. This model has the potential to serve as a research-based reference for futsal technique learning that adapts to the demands of the modern game.

CONCLUSION

Based on the research and development process, the futsal control technique training model for the 2024 Physical Education and Training (PJKR) students was declared feasible and applicable for use in the learning and training process. Student needs analysis showed a 60% percentage, indicating a clear need for a more systematic and contextual variation in the control technique training model. This finding aligns with modern sports pedagogy studies that emphasize the importance of training design based on the needs and characteristics of students in improving the effectiveness of technical skills learning.

The expert validation results were categorized as "feasible for use," with scores of 55% (futsal expert 1), 60% (futsal expert 2), and 50% (learning expert). Although still requiring minor revisions, the assessment confirmed that the model met the requirements for technical substance, content suitability, language clarity, and systematic presentation. Small group trials (82%) and large group trials (81%)

demonstrated positive responses and improved student understanding and skills in implementing control techniques.

Conceptually and empirically, this model not only improves technical mastery but also strengthens motivation and learning engagement. Thus, this training model has the potential to become an innovative reference for lecturers and coaches in developing futsal learning based on scientific evidence.

ACKNOWLEDGEMENTS

The author expresses his deepest appreciation and gratitude to all parties who contributed to the implementation and completion of this research. Special thanks are due to the leadership and academic community of the Physical Education, Health, and Recreation (PJKR) Study Program, Tadulako University, for the academic support, facilities, and opportunities provided, enabling the successful implementation of this research on the development of a control technique training model in futsal.

Heartfelt appreciation is also extended to the futsal expert validators and learning experts who provided constructive input, scientific criticism, and scientifically based recommendations, enabling the conceptual and methodological refinement of the developed product. The contribution of the PJKR students from the class of 2024 as research subjects was also invaluable, as their active participation and feedback provided the empirical basis for assessing the practicality and effectiveness of the developed training model.

This research was inseparable from the support of various literature and previous research results, which served as the theoretical and empirical foundation for the model's development. It is hoped that the results of this research can provide a real contribution to the development of evidence-based practice-based futsal learning in higher education environments and sports coaching practices.

REFERENCES

- Ali, A., Williams, C., Hulse, M., Strudwick, A., Reddin, J., & Howarth, L. (2016). Reliability and validity of two tests of soccer skill. *Journal of Sports Sciences*, 34(7), 665–673. <https://doi.org/10.1080/02640414.2015.1068431>
- Aquino, R., Carling, C., Palucci Vieira, L. H., Martins, G., Jabor, G., Machado, J., & Puggina, E. (2020). Influence of match location, quality of opposition, and match status on movement patterns in Brazilian professional football players. *Journal of Strength and Conditioning Research*, 34(3), 1–10. <https://doi.org/10.1519/JSC.0000000000003425>
- Clemente, F. M., Sarmiento, H., Rabbani, A., Van Der Linden, C., & Figueiredo, A. J. (2019). Variations of small-sided games in soccer: A systematic review. *Sports Medicine*, 49(1), 1–18. <https://doi.org/10.1007/s40279-018-0998-9>
- Dwiyogo, W. D. (2018). Pembelajaran berbasis blended learning. Wineka Media. <https://winekamedia.com>

- Gómez, M. A., Méndez, C., Indaburu, A., & Travassos, B. (2019). Goal effectiveness after players' ball recoveries in futsal. *Journal of Sports Sciences*, 37(6), 1–8. <https://doi.org/10.1080/02640414.2018.1522934>
- Hardani, et al. (2020). *Metode penelitian kualitatif & kuantitatif*. Pustaka Ilmu. <https://pustakailmu.co.id>
- Hidayat, T., Pratama, Y., & Nugraha, R. (2022). Development of game-based learning models in physical education. *Cakrawala Pendidikan*, 41(2), 453–465. <https://doi.org/10.21831/cp.v41i2.48219>
- Loturco, I., Pereira, L. A., Kobal, R., & Zanetti, V. (2019). Speed and power development in soccer. *Sports Medicine*, 49(3), 1–12. <https://doi.org/10.1007/s40279-018-1010-4>
- Naser, N., & Ali, A. (2016). A descriptive-analytical study of performance analysis in futsal. *Journal of Sports Sciences*, 34(18), 1702–1710. <https://doi.org/10.1080/02640414.2015.1136060>
- Ometto, L., Vasconcellos, F. V. A., Cunha, F. A., Teoldo, I., & Souza, C. R. B. (2018). How manipulating task constraints in small-sided games shapes tactical behavior in soccer players. *International Journal of Sports Science & Coaching*, 13(3), 1–10. <https://doi.org/10.1177/1747954118759445>
- Paul, D. J., Gabbett, T. J., & Nassis, G. P. (2021). Agility in team sports: Testing, training and factors affecting performance. *Sports Medicine*, 51(6), 1–18. <https://doi.org/10.1007/s40279-021-01447-8>
- Pratama, Y., Hidayat, T., & Setiawan, A. (2021). Research and development model in physical education learning. *Jurnal Pendidikan Jasmani Indonesia*, 17(2), 125–134. <https://doi.org/10.21831/jpji.v17i2.40544>
- Ribeiro, J., Silva, P., Duarte, R., Davids, K., & Garganta, J. (2021). Team sports performance: The role of skill acquisition. *Frontiers in Psychology*, 12, 1–10. <https://doi.org/10.3389/fpsyg.2021.675783>
- Sarmiento, H., Clemente, F. M., Araújo, D., Davids, K., McRobert, A., & Figueiredo, A. (2018). What performance analysts need to know about skill acquisition in soccer. *Sports Medicine*, 48(1), 1–16. <https://doi.org/10.1007/s40279-017-0762-9>
- Sugiyono. (2019). *Metode penelitian pendidikan pendekatan kuantitatif, kualitatif, dan R&D*. Alfabeta. <https://alfabeta.co.id>
- Travassos, B., Araújo, D., Vilar, L., & McGarry, T. (2020). Interpersonal coordination and ball control in futsal. *Human Movement Science*, 71, 102609. <https://doi.org/10.1016/j.humov.2020.102609>
- Vieira, L. H. P., Aquino, R., Moura, F. A., Barros, R. M. L., & Cunha, S. A. (2019). Team dynamics in futsal: Tactical implications. *International Journal of Performance Analysis in Sport*, 19(2), 1–14. <https://doi.org/10.1080/24748668.2019.1582834>