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Design and evaluation of a circuit-based team competition model to enhance fundamental athletic skills in primary school physical education

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ABSTRACT

Background: Innovative learning models are essential for enhancing fundamental athletic skills among primary school students. Traditional methods often fail to engage learners, leading to low participation and limited skill development in physical education (PE). There is a need for engaging, structured models that effectively combine physical activity with motivation and teamwork. **Research Objectives:** This study aims to design and evaluate the effectiveness of a circuit-based team competition model to improve basic athletic techniques in primary school PE. **Method:** A research and development (R&D) approach was used, involving 30 purposively selected students. The model was developed through expert validation and implemented over a five-week field trial. Data were collected using expert judgment forms and a fundamental athletics skill test. A one-sample t-test was conducted to assess pretest and posttest differences. **Finding/Results:** The implementation of the model resulted in significant improvements in students' athletic performance. The mean score increased from 62.4 (SD = 5.3) to 78.6 (SD = 6.1), with a statistically significant result ($t = 6.24$; $p < 0.001$). Approximately 90% of students demonstrated notable improvement. The highest gains were observed in sprinting and mini hurdles, which also showed strong instrument validity ($r = 0.68–0.69$). **Conclusion:** The circuit-based team competition model is effective in enhancing primary students' basic athletic skills while also boosting motivation and active participation. This study offers a promising approach for improving learning strategies in physical education.

Keywords: Group competition model; circuit method; basic techniques; athletics

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INTRODUCTION

Physical education plays an important role in developing motor skills, physical fitness, and sportsmanship of students. Basic athletic techniques in physical education learning are fundamental aspects that students must master from an early age (Charest, 2022; Newby, 2023; Yuwono et al., 2025). Athletics is the parent of various sports that require effective learning methods so that students can understand and master basic techniques well (Kliethermes, 2020; Maloney, 2021). However, in practice, learning basic athletic

techniques is often faced with challenges such as low student participation, lack of variation in teaching methods, and low motivation in the learning process. Therefore, a more interesting and effective learning model is needed to improve the learning outcomes of basic athletic techniques.

Basic athletic techniques are essential skills that students must master from an early age because they form the foundation for various physical activities and sports (Kemmler, 2021; Kliethermes, 2020). Athletics is known as the "mother of sports" because it includes fundamental movements such as running, jumping, throwing, and catching (Aliriad et al., 2023). These movements not only play a role in the development of basic motor skills, but also form the basis for various other sports, such as football, basketball, volleyball and badminton (Lago-Peñas, 2023; Silva, 2023). Mastering basic athletic techniques from an early age is very important in supporting students' physical, motoric, and social development. Through structured athletic training, students can improve body coordination, balance, and muscle strength that play a role in daily physical activities and more complex sports (Finlay, 2022).

Athletic training involves a variety of dynamic movements that help improve cardiovascular endurance, flexibility, and muscle strength, thereby contributing to optimal growth and long-term health (Dwijayanti et al., 2024; Petersen, 2023; Adi, Aliriad, Arbanisa, et al., 2023). This habit also in stills a sustainable active lifestyle, which can prevent health problems such as obesity and improve overall well-being. Basic athletic technique training can also increase students' self-confidence through the achievement of mastering certain movements (Aliriad, Adi, et al., 2024; Satria et al., 2024). Participation in group exercises teaches cooperation, communication, and sportsmanship, which are important in a child's social development (Clemente, 2021; Putnick, 2020). In addition, research shows that good motor skills are correlated with cognitive development, where regular physical activity can improve students' focus, memory, and problem-solving abilities in the learning process.

Technique Basic skills are very important for students' motor development. Lack of interesting learning methods, minimal innovative tools, and limited structured training programs are the main obstacles in developing skills (Talent, 2021). Therefore, a more innovative and effective learning approach is needed to help students master basic athletic techniques more optimally. A circuit-based game approach combined with athletic learning can be an effective solution. This research method not only provides interesting variations of physical movements, but also utilizes and helps students coordinate movements better, thereby increasing the effectiveness of learning basic athletic techniques.

Several previous studies have explored physical learning methods to improve teaching effectiveness (Da'i & Aliriad, 2021; Martinus et al., 2024; Adi, Aliriad, Nova, et al., 2023). The circuit method, known as a training technique involving a series of physical activities performed sequentially at certain time intervals, has been widely applied in physical education (Aliriad et al., 2025; Aliriad, Adi, et al., 2024). The circuit method can improve students' motor skills and physical endurance. In addition, the group competition model in physical education found that the competition model can improve students' motivation and cooperation in sports activities (Afrillan et al., 2024; Rukiah & Malik, 2024; Silitonga, 2023).

Unlike previous studies, this study integrates two effective approaches, the circuit method and the group competition model, into a single model for learning basic athletic techniques. Previous studies have only examined one approach at a time, either the effectiveness of circuit training in improving physical fitness or the effectiveness of

competition models in increasing student motivation (Wijaya et al., 2024). However, few studies have specifically examined the synergy between the two approaches in the context of learning basic athletic techniques in physical education. This study makes a new contribution by testing the effectiveness of combining these methods to optimally improve basic motor skills, motivation and student learning outcomes. This study demonstrates the need for innovative physical education learning methods that engage students and improve their abilities across the board.

Various theories and concepts have supported the importance of the circuit method and the group competition model. Constructivism theory emphasizes that effective learning occurs when learners are actively involved in meaningful activities, including in a positive competitive environment (McCourt, 2022). Intrinsic and extrinsic motivation show that healthy competition can increase students' motivation to actively participate in physical education learning (Aliriad, Adi, et al., 2024; Da'i et al., 2024). Circuit method and group competition model have been widely studied separately, studies on the effectiveness of the combination of both in learning basic athletic techniques are still limited. This study offers a new contribution by integrating the group competition model in physical education, which is expected to improve students' basic athletic technique skills more optimally than learning methods that are in accordance with the material without development. This study also provides new insights into how a competition-based learning approach can improve students' motivation, cooperation, and learning outcomes in athletics.

This study aims to test the effectiveness of the group competition model on basic athletic techniques through the circuit method in physical education. Specifically, this study focuses on the impact of the application of the group competition model on students' basic athletic technique skills, to determine the extent to which this method can improve students' abilities in performing basic athletic movements. Measuring the effectiveness of the circuit method in improving students' athletic performance, so that it can assess whether this approach provides better results than conventional learning methods. With this research, it is expected to contribute to the development of more effective, innovative, and interesting physical education learning methods for students, so that they can be more motivated and active in the physical education learning process.

METHOD

The research procedure began with the development of an initial model based on a needs analysis and learning theory. Ethical clearance for the study was obtained from the institutional research ethics committee to ensure adherence to ethical research standards. Parental/guardian informed consent was secured for all student participants prior to data collection, and student assent was also obtained.

The initial model was validated by four experts: a physical education content expert, a motor learning specialist, a curriculum planning expert, and a practicing physical education teacher. Following expert validation, the model underwent limited-scale trials to gather preliminary feedback. Based on these results, the model was revised and implemented in a five-week field trial involving a larger student group. A final evaluation was conducted to assess its effectiveness in improving mastery of basic athletic techniques.

Research Design

This study uses the Research and Development (R&D) method with a learning model development approach. The research design involves systematic stages including needs analysis, initial product development, expert validation, limited trials, product revision, field trials, evaluation and finalisation. The model is based on learning the basic

techniques of athletics through group competition using the circuit method. The purpose of this design is to generate learning models that are theoretically valid and effective in physical education practice.

Participants/Subjects

The subjects in this study were primary school students taking part in physical education lessons involving athletic equipment (Aliriad et al., 2025; Manullang et al., 2024; Satria, Aliriad, et al., 2023). The sample was determined using a purposive sampling technique to select students relevant to the study's purpose. This study involved 30 students. The selection criteria included students actively participating in Physical Education lessons and of primary school age. The trial was implemented over a period of five weeks, in accordance with the school's lesson schedule.

Research Procedure

The research procedure begins with the development of an initial model based on a needs analysis and learning theory. This model was then validated by four experts: physical education material experts, motor experts, learning planning experts and Physical Education teachers. After validation, the model was tested on a small scale in limited groups to obtain initial feedback. The results of this initial testing were used to revise the model, which was then tested on a larger group in a five-week field trial. A final evaluation was conducted to assess the model's effectiveness in improving students' mastery of basic athletic techniques.

Research Instruments

This study used the following instruments: an expert assessment scale for model validation; a test of basic athletic technique skills comprising six stations in a circuit (sprint, long jump, turbo throw, relay, mini hurdles and mini shot put); and observation sheets to assess student activity and motivation during learning. These instruments are designed to provide a comprehensive overview of the models' validity and effectiveness.

Data Analysis

The data in this study were analysed using descriptive analysis and statistical tests. Descriptive analysis was used to present data on expert validation results, student observation results and evaluation of learning activities. To test the effectiveness of the model, a one-sample t-test was used to compare the pretest and posttest values of students. Additionally, the Content Validity Index (CVI) and the Content Validity Ratio (CVR) were employed to evaluate the necessity and suitability of each model component based on expert evaluations, ensuring the model exhibits robust content validity.

Table 1. Initial Model of Athletic Group Competition with Circuit Method

Circuit Post	Basic Techniques Practiced	Activity Description
Sprint	Start, accelerate, finish	Children run 30 meters with a crouching/ready start
Long jump	Initiation, repulsion, hovering, landing	The child jumps as far as possible from the take-off line.
Turbo Throw (Mini Javelin)	Grip, swing and release techniques	Children throw turbo into a target at a certain distance.
Relay Race	Technique of carrying the baton, changing the baton	Children run and pass the baton to their teammates.
Mini Hurdles	Step coordination, low hurdle jump	Children pass 5 small obstacles using hurdles technique

Circuit Post	Basic Techniques Practiced	Activity Description
Mini Shot Put	Techniques for holding, rejecting and landing the shot	Child pushes small medicine ball to target area

Validation in this study involved four experts in the field of athletics consisting of physical education material experts, motor experts, learning planning experts, and physical education teachers. The validation process was carried out to ensure that the developed model has a high level of validity and is in accordance with the needs of athletic learning. To assess the validity of the model content, Content Validation Index (CVI) and Content Validity Ratio (CVR) analysis were used (Rahmat et al., 2024; Wang & Sahid, 2024). CVI is used to measure the level of agreement of experts on the relevance of each component in the model, while CVR is used to assess the extent to which an element in the model is considered essential by experts. The results of the analysis of these two methods will be the basis for determining the validity of the model content and making improvements or refinements if necessary, so that the resulting model is truly in accordance with scientific standards and practical needs in athletic learning.

Table 2. Scale for Assessing Teaching

Scale	Assessment Description
1	Very Inappropriate / Very Inappropriate / Very Unsafe / Very Inconvenient / Very Impractical / Very Unsafe
2	Unsuitable / Inadequate / Unsafe / Uncomfortable / Impractical / Unoptimizable
3	Accurate / Precise / Safe / Easy / Practical / Can Be Optimized
4	Very Suitable / Very Accurate / Very Safe / Very Easy / Very Practical / Very Optimal

Table 3. Expert Validation Assessment Instrument

No	Assessment Aspects	Rating Scale			
		1	2	3	4
1	The suitability of the developed circuit competition model with competency standards, basic competencies and indicators				
2	Conformity between indicators and content and assessment in learning basic athletic techniques				
3	The accuracy of the contents of the circuit competition model with a sequence of movements that are appropriate for elementary school children.				
4	The accuracy of the circuit competition content with a sequence of movements that suits the characteristics of the students.				
5	Development of a circuit competition model in athletic learning that emphasizes student safety				
6	The convenience of the circuit competition model in learning basic athletic techniques that are developed				
7	Practicality of circuit competition model in Group Competition Model with Circuit Method to Improve Basic Athletic Techniques				
8	The circuit competition model can increase children's physical activity in athletic learning.				
9	The circuit competition model can optimize students' cognitive understanding of basic athletic techniques.				
10	Group Competition Model with Circuit Method to Improve Basic Athletic Techniques in Elementary School Children can improve students' athletic skills				

Table 3. Group Competition Model Assessment for students with the Circuit Method

Competition Model	Assessment Aspects	Rating Scale			
		1	2	3	4
Sprint	Speed and starting technique Consistent acceleration to the finish line				
Long jump	Starting and pushing technique Distance and control when landing				
Turbo Throw	Grip and swing techniques				

Competition Model	Assessment Aspects	Rating Scale			
		1	2	3	4
Relay Race	Accuracy and distance of throw Technique for carrying and handing a stick Coordination between team members				
Mini Hurdles	Step and jump coordination techniques Travel time to complete the track				
Mini Shot Put	Techniques for holding and throwing the ball Distance and direction control of the push				

RESULTS AND DISCUSSION

The results of the Content Validity Ratio (CVR) test Table 4 on the circuit method to improve basic athletic techniques show that all aspects of this method have good validity based on the assessment of four experts. The scores given on a scale of 1-4 indicate that the average assessment is in the range of 3.6 to 3.8, with a CVR value ≥ 0.5 for each aspect, which means that all indicators in this method are valid. The CVR calculation is based on the number of experts who gave high ratings (3 or 4) compared to the total number of experts who assessed, with an average CVR result of 0.7. These results indicate that this circuit method is effective and relevant to be applied in improving basic athletic techniques. This method can help athletes develop basic technique skills, improve movement consistency, and improve coordination and exercise efficiency, making it suitable for use in athletic learning and training.

Table 4.CVR Test Results Circuit Method to Improve Basic Athletic Techniques

No	E1	E2	E3	E4	no	N	N/2	ne(N/2)	CVR	Criteria
1	4	3	4	4	3	4	2	1	0.5	valid
2	4	4	3	4	4	4	2	2	1	valid
3	3	4	4	3	3	4	2	1	0.5	valid
4	4	4	4	4	4	4	2	2	1	valid
5	3	3	4	4	3	4	2	1	0.5	valid
6	4	4	4	4	4	4	2	2	1	valid
7	3	4	3	4	3	4	2	1	0.5	valid
8	4	4	4	3	3	4	2	1	0.5	valid
9	3	4	4	4	3	4	2	1	0.5	valid
10	4	4	4	4	4	4	2	2	1	valid
Total	36	38	38	38	**Total**				7	
Average	3.6	3.8	3.8	3.8	**Average**				0.7	valid

The results of the validity test of the learning model development instrument in Table 5 show that all aspects of student assessment in various athletics branches have good validity. Based on the correlation coefficient (r) values ranging from 0.50 to 0.69 with a significance level of p = 0.05, all aspects are declared valid. The highest correlation values are in Mini Hurdles (0.69) and Sprint (0.68), indicating that this instrument has a strong relationship with the overall assessment. While the lowest correlation value remains within the acceptable limit, which is 0.50, which still meets the validity criteria. Thus, this instrument can be used to assess students' abilities in various athletic skills, including sprinting, long jump, turbo throw, relay race, and mini hurdles. Good validity indicates that the assessment instrument developed is feasible and accurate to measure the effectiveness of the learning model in improving students' basic athletic skills.

Table 5. Results of Validity Test of Learning Model Development Instruments

Student Assessment Aspects	Score Rater	Correlation Coefficient	P	Status
Sprint	Rater 1 - total rater score	0.68	0.05	Valid
	Rater 2 - total rater score	0.50	0.05	Valid
Long jump	Rater 3 - total rater score	0.50	0.05	Valid
	Rater 1 - total rater score	0.61	0.05	Valid
Turbo Throw	Rater 2 - total rater score	0.61	0.05	Valid
	Rater 3 - total rater score	0.51	0.05	Valid
Relay Race	Rater 1 - total rater score	0.57	0.05	Valid
	Rater 2 - total rater score	0.50	0.05	Valid
Mini Hurdles	Rater 3 - total rater score	0.69	0.05	Valid
	Rater 1 - total rater score	0.63	0.05	Valid

Table 6. Expert validation of the Group Competition Model using the circuit method

Rated aspect	Sports Learning Expert Notes	Athletic Expert Notes
Suitability of the model to athletic learning	The model is in accordance with the principles of game-based learning which increases children's motivation.	The model includes basic athletic skills necessary for a child's motor development.
Effectiveness of circuit method	The circuit-based approach helps increase student engagement and reduce boredom.	The model includes locomotor, manipulative, and balance movements that are important in athletics.
Sprint	Helps children improve starting, acceleration and speed techniques.	Train explosiveness and reflexes in sprinting movements.
Long jump	Develop coordination between starting, pushing off and landing which is important in jumping.	Improves balance and propulsion power while floating in the air.
Turbo Throw (Mini Javelin)	Teaches proper grip, swing and release techniques.	Train hand and eye coordination and arm strength in throwing.
Relay Race	Improve teamwork and baton passing techniques.	Train reflexes and hand coordination in receiving and giving the stick.
Mini Hurdles	Train agility and speed in dealing with small obstacles.	Develop balance, step coordination and body control when jumping over hurdles.
Mini Shot Put	Teaches proper shot-put techniques to avoid injury.	Trains arm muscle strength and movement coordination in pushing.
Safety in learning	The model has paid attention to the safety aspects of students during training.	Teacher guidance is needed to ensure correct technique to prevent the risk of injury.
Impact on children's physical activity	This model can increase children's active participation in athletic learning.	This model helps children optimize the development of basic motor skills in athletics.

Table 7. Revision of the Group Competition Model with the circuit method

Circuit Post	Basic Techniques Practiced	Activity Description (Repair)
Sprint	Start, accelerate, finish	Children run 30 meters with a crouching/ready start, given a variety of reaction exercises to improve reflexes and explosiveness. A safe landing area is prepared to reduce the risk of injury.
Long jump	Initiation, repulsion, hovering, landing	Children jump as far as possible from the take-off line with varying starts. Coordination exercises using ropes or cones are added to improve balance and body control.
Turbo Throw (Mini Javelin)	Grip, swing and release techniques	Kids throw turbo into a certain distance target with a variety of targets to improve hand-eye coordination. Added safety zone to avoid the risk of injury.

Circuit Post	Basic Techniques Practiced	Activity Description (Repair)
Relay Race	Technique of carrying the baton, changing the baton	Children run and pass the baton to their teammates with variations of baton exchange exercises while moving to train coordination and reflexes.
Mini Hurdles	Step coordination, low hurdle jump	Children pass 5 small obstacles with hurdles technique. Added drills to improve balance and body control when jumping over hurdles.
Mini Shot Put	Techniques for holding, rejecting and landing the shot	Children push a small medicine ball into the target area with correct technique. Teacher assistance is added to ensure safe and effective pushing technique.
	Safety in learning	Each training station is supervised by a teacher to ensure children use correct techniques and reduce the risk of injury. Use equipment that is safe and appropriate to the child's size and strength. Provide warm-up and cool-down before and after exercise to reduce the risk of injury.
Improved Security and effectiveness of the model	Effectiveness of Circuit Method	The exercises are designed to be more varied to avoid boredom and increase children's motivation. Rotation between posts is provided with sufficient rest time so that children remain fit and focused during training.
	Impact on children's physical activity	This model optimizes the development of children's motor skills through fun, game-based exercises. Added variations of exercises that are more adaptive to the child's individual abilities to increase active participation.

The results of the assessment of the athletic group competition model for students with the circuit method showed a significant increase between the pre-test and post-test results. Of the 30 samples tested, the majority of participants experienced an increase in scores after following the circuit method. The difference in scores between the pre-test and post-test ranged from 0 to 22, with the highest increase found in participants IK (22 points), XY (20 points), AO (20 points), TH (20 points), and LM (20 points), indicating that the circuit method was very effective for them. Most participants experienced an increase of more than 10 points, indicating that this method contributed significantly to improving students' athletic skills. However, there was one participant (AF) who did not experience a change in score (0 points), as well as several other participants who experienced minimal improvement (2-5 points), such as VW (2 points), DA (4 points), and RF (5 points). Overall, these results indicate that the circuit method is effective in improving students' athletic skills, with most participants showing significant improvement after following the learning program. This model can be a good strategy in learning athletics, especially in developing physical skills, endurance, and basic athletic techniques in a gradual and structured manner.

Table 8. Results of the Athletic Group Competition Model Assessment for students with the Circuit Method

Pre-test	Post-test	Difference	No	Sample	Pre-test	Post-test	Difference
22	38	16	16	DA	29	33	4
27	34	7	17	RF	24	29	5
27	44	17	18	BG	27	37	10
23	35	12	19	TH	22	42	20

Pre-test	Post-test	Difference	No	Sample	Pre-test	Post-test	Difference
24	41	17	20	UJ	25	36	11
29	29	0	21	I.K.	24	46	22
24	37	13	22	VW	29	31	2
27	48	21	23	XY	24	44	20
22	33	11	24	M N	27	33	6
25	34	9	25	OP	22	29	7
22	42	20	26	QZ	25	37	12
27	36	9	27	LM	22	42	20
27	46	19	28	ST	27	36	9
23	31	8	29	CD	27	46	19
24	44	20	30	EF	23	31	8

Table 9. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Pre-test	30	22.00	29.00	25.0000	2.31933
Post-test	30	29.00	48.00	37.4667	5.78186
Valid N (listwise)	30				

The descriptive statistics results in Table 9 show that out of 30 samples, the pre-test scores ranged from 22 to 29 with an average of 25.00 and a standard deviation of 2.319. Meanwhile, the post-test scores showed a significant increase with a score range of 29 to 48, an average of 37.47, and a standard deviation of 5.782. The results of the one-sample t-test showed that both pre-test and post-test scores had a significance of $p = 0.000$ ($p < 0.05$), which means that the difference in the averages was statistically significant. The t-test value for the pre-test was 59.039 and for the post-test was 35.493, indicating that there was a significant increase in the post-test scores compared to the pre-test. The 95% confidence interval also showed that the results were within a reliable range (pre-test: 24.13 - 25.87, post-test: 35.31 - 39.63).

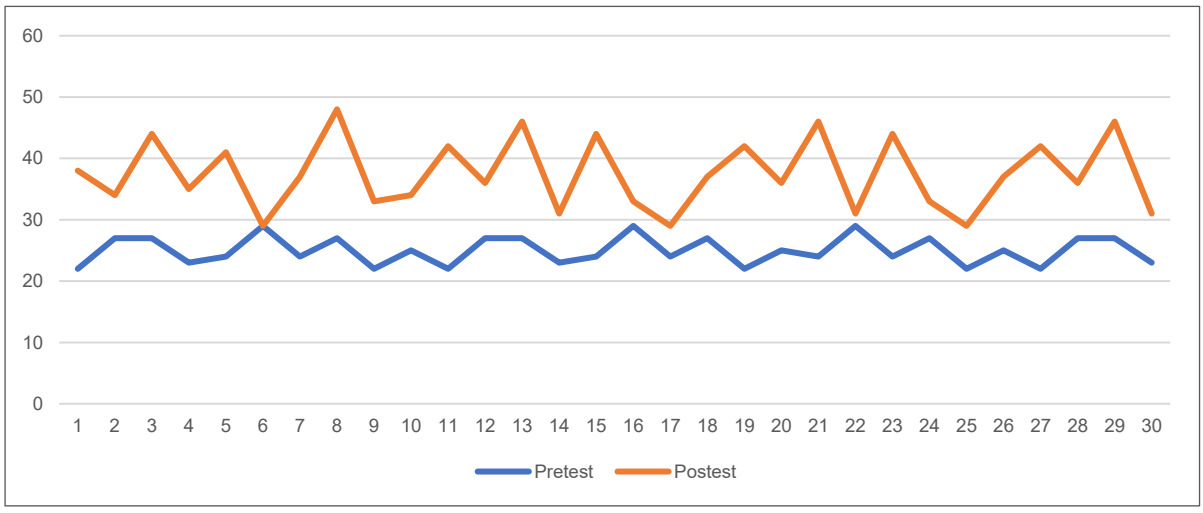

Figure 1. Athletics Group Competition Results Diagram

Table 10. One-Sample T Test Results

One Sample Test	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference
Pre-test	59.039	29	0.000	25.00000	24.1339 - 25.8661
Post-test	35.493	29	0.000	37.46667	35.3077 - 39.6256

The main problem in athletic learning and training is the effectiveness of the methods used to improve basic athletic techniques systematically and sustainably. One approach

that is widely used is the circuit method, which combines repeated and varied exercises to improve motor and physical skills. However, the validity and effectiveness of this method in the context of improving students' athletic skills still need further research. Therefore, this study was conducted to evaluate the validity of the circuit method and its effectiveness in improving basic athletic techniques.

The results of this study indicate that the circuit method has good validity based on the Content Validity Ratio (CVR) analysis (Bujang et al., 2025; Rahmat et al., 2024), and testing of athletic skill assessment instruments. In addition, there was a significant increase in post-test scores compared to pre-test after the implementation of the circuit method. These findings indicate that the circuit method is not only theoretically relevant but also has a positive impact on students' athletic skills in various sports.

The findings of this study are in line with the results of research conducted by Afrillan et al. (2024), and Satria et al. (2023), which confirmed that circuit-based training is effective in improving athletes' physical abilities and technical skills. Another study by Adi, Aliriad, Nova, et al. (2023) also supports that the circuit method improves strength, endurance, and coordination in young athletes. Other studies on training methods based on exercise variation have shown better results than conventional methods, which supports the findings in this study (Hagyard, 2021; Mazaheri, 2021; Pérez-Gómez, 2022). However, there are some differences in the results of this study compared to other studies. Research by Radnor (2020) and Tallent (2021) stated that specific skill-based training was more effective than the circuit method in improving advanced athletic skills. This suggests that the circuit method is more suitable for basic skill development and not for advanced skill improvement.

This study provides a new contribution in assessing the effectiveness of the circuit method not only in terms of improving skills, but also through the validation of the instruments used. The use of CVR as a validation method shows that every aspect of this method has met good standards for use in athletic learning. In addition, the results of this study indicate that the circuit method can improve various athletic skills as a whole, including sprinting, hurdling, long jump, and turbo throwing.

The main impact of this research is its application in athletic learning in schools or sports academies. With empirical evidence on the effectiveness of the circuit method, teachers and coaches can be more confident in implementing this method to improve students' athletic skills. In addition, this study also shows that the circuit method can be used as a more accurate evaluation tool for athletic development.

Although the majority of students showed significant improvement in basic athletic skills, a small number did not exhibit notable changes. This indicates the need for further interpretation of individual factors that may have influenced outcomes, such as student motivation, initial physical readiness, or clarity of instruction during the learning process. It is also important to investigate whether the effectiveness of the circuit method is consistent across all activity types. For instance, sprinting and mini hurdles may be easier to grasp and perform compared to relay running, which requires group coordination. These activity-specific differences should be examined further to understand the contribution of each element within the circuit structure.

The effectiveness of the group competition model using the circuit method may stem from several pedagogical and psychological mechanisms. The rotation between activity stations helps sustain attention and engagement, while the competitive group dynamic promotes active participation and collaboration. Moreover, repeated exposure to technical tasks through varied contexts enhances skill acquisition and retention. Although these mechanisms are theoretically plausible, further research is needed to verify their

impact through qualitative or mixed-method approaches that examine student behavior and perceptions during implementation.

Based on the findings and limitations of this study, several directions for future research are proposed. First, comparative analysis across individual circuit components can help identify which athletic skills respond most effectively to the model. Second, longitudinal studies are needed to assess the sustained impact of the method over time. Third, experimental designs comparing the circuit approach with other instructional methods such as skill-based or interval training can provide broader insights into pedagogical effectiveness. Fourth, psychological factors such as motivation, self-confidence, and group dynamics should be explored to understand the model's non-physical impact. Finally, the integration of technology such as motion sensors, video analysis software, or wearable fitness trackers is encouraged to enhance the objectivity and precision of skill evaluation in physical education.

CONCLUSION

This study demonstrates that the circuit method within the group competition model effectively improves basic athletic techniques among elementary school children. The approach highlights the value of structured and varied exercises in strengthening motor skills while fostering student engagement and motivation. Practically, the findings suggest that integrating this method into physical education can support both skill development and active participation. However, the limited sample size and single-school setting restrict generalizability. Future research with larger samples, controlled designs, and longitudinal approaches—along with comparisons to other training methods and exploration of psychological factors—will offer more details about its long-term effectiveness.

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CONFLICT OF INTEREST

The authors declare that they have no competition.

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