

Feasibility Analysis of Circuit Game Model to Develop Basic Locomotor Skills of Lower Grade Students

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ABSTRACT

This research aims to evaluate the feasibility of the circuit game model in enhancing the basic locomotor skills of lower-grade students at SD Negeri 1 Labalawa, Waborobo Village. The method employed is a quasi-experimental design with a pretest-posttest format. The sample consists of 73 students from grades 1 to 3, selected purposively. The intervention was conducted over eight weeks with two training sessions per week. Data were collected using TGMD-3, observation sheets, and questionnaires. The results indicate a significant improvement in locomotor skills following the intervention ($p < 0.05$). In conclusion, the circuit game model is effective in enhancing children's basic motor skills and can be integrated into the physical education curriculum. This study provides recommendations for teachers in developing more interactive and enjoyable game-based learning.

Keywords: *Circuit Game Model, Locomotor Skills, Lower Grade Students*

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INTRODUCTION

The development of fundamental movement skills in elementary school-aged children is a crucial aspect of physical education learning. Locomotor skills, which include running, jumping, and stepping, play an important role in supporting children's motor, cognitive, and social development (Donnelly et al., 2017). However, various studies indicate that many elementary school-aged children experience deficits in locomotor skills due to a lack of structured physical activity in the school curriculum (Hardy et al., 2012; Logan et al., 2018). This condition is further exacerbated by the increasing use of technology and lifestyle changes that lead to sedentary behavior (Liu et al., 2024). Therefore, there is a need for innovative learning models that can enhance children's locomotor skills, one of which is through a circuit-based play approach.

The development of basic movement skills in elementary school-aged children is an important foundation in shaping an active and healthy lifestyle in the future. In the context of physical education, locomotor skills such as running, jumping, and sliding are

fundamental components that need to be developed from an early age, especially in lower-grade students. Recent studies by Apriliani et al. (2023) reveal that 45% of elementary school students in Indonesia still demonstrate suboptimal levels of locomotor skills, particularly in the aspects of coordination and dynamic balance (Apriliani et al., 2020).

Various learning approaches have been developed to enhance students' locomotor skills; however, most remain conventional and do not adequately consider the learning characteristics of children in the digital era (Chen & Morgan, 2023). A longitudinal study conducted by Mohan et al. (2024) indicates that traditional learning methods tend to be monotonous and less effective in maintaining students' learning motivation, with active engagement levels reaching only 60% during physical education sessions (Mohan et al., 2024). This aligns with the findings of Cai (2024), who identified the need for more adaptive learning innovations in response to the changing times (Cai, 2024).

The circuit play model has long been used in physical education to enhance children's motor skills (Lai et al., 2014). This game involves a series of physical activities performed sequentially with variations in challenges that can be adjusted to the developmental level of the child (Beighle et al., 2004; Carson et al., 2014). Recent studies indicate that the circuit play model is effective in improving fundamental motor skills, physical fitness, and active participation in physical activities (Koolwijk et al., 2024). Nevertheless, there is still limited research specifically evaluating the feasibility analysis of the circuit play model in enhancing locomotor skills in lower-grade elementary school children.

The gap between the need for the development of locomotor skills and the effectiveness of existing learning methods opens opportunities to develop innovative approaches that are more aligned with the characteristics of learners (Almusawi et al., 2021; Lei et al., 2023; Li, 2024; Sun & Gu, 2024). The Circuit Game learning model emerges as a promising alternative, integrating elements of play with a structured circuit system to systematically and enjoyably develop locomotor skills. Preliminary studies by (Tya Maya Ningrum et al. (2023) indicate the positive potential of using game-based approaches in enhancing active student participation by up to 82.89% in fundamental movement learning (Tya Maya Ningrum et al., 2023).

The urgency of this research is further reinforced by the findings of Ministry of Education and Culture (2020), which reported a 15% decline in the physical fitness levels of elementary school students over the past five years (Amin Sulistiono et al., 2020; Hasmara & Ma'arif, 2022). Hardinata et al. (2024) emphasize that this situation requires immediate intervention through learning approaches that are not only effective in developing locomotor skills but also capable of motivating students to actively participate in physical activities (Hardinata et al., 2024).

The novelty of this research lies in the development of a Circuit Game model specifically designed for lower-grade students, taking into account the holistic aspects of motor, cognitive, and socio-emotional development (Syaukani et al., 2023). Unlike previous studies that tended to focus on a single aspect of locomotor skills (Syafliin et al., 2021), this

study integrates various elements of fundamental movement in a structured and adaptive game format.

This research aims to fill the gap by conducting a feasibility analysis of the circuit game model in developing basic locomotor skills in lower-grade elementary school children. This study is important considering that this age stage is a critical period in the development of motor skills, which will impact participation in physical activities in the future (Burton et al., 2023). Furthermore, this research provides an evidence-based approach in the development of physical education curriculum, which can assist teachers in formulating more effective and enjoyable learning strategies for children.

The main contribution of this research to the field of physical education includes the development of an innovative learning model based on empirical evidence, taking into account the specific characteristics and needs of lower-grade students. The results of this study are expected to serve as a reference for educators in designing more effective and enjoyable basic movement learning programs. Furthermore, the findings of this research also have the potential to provide a theoretical and practical foundation for the development of a physical education curriculum that is more adaptive to the learning needs of the 21st century. This study also fills the gap in the literature related to the development of locomotor skills in lower grade students, particularly in the context of game-based learning. By integrating modern pedagogical perspectives and principles of motor development, this research offers a new approach to understanding and facilitating the development of fundamental movement skills in elementary school-aged children.

METHOD

This research employs a quantitative approach with a quasi-experimental design. This method was chosen to evaluate the effectiveness and feasibility of the circuit game model in developing basic locomotor skills of lower grade students at SD Negeri 1 Labalawa, Waborobo Village. The objective of this research is to target lower grade students (grades 1, 2, and 3) who are still in the stage of basic motor development. The sample size consists of 24 grade 1 students, 29 grade 2 students, and 20 grade 3 students, totaling 73 students. The research sample was taken using purposive sampling techniques, where students were selected based on specific criteria, namely those who do not yet possess optimal locomotor skills based on initial assessments using the Test of Gross Motor Development (TGMD-3) developed by (Ulrich, 2016).

The main instruments used in this research include: 1) Test of Gross Motor Development – Third Edition (TGMD-3) to measure students' locomotor skills before and after the intervention. 2) Observation sheets to record students' activity during the implementation of the circuit games. 3) Perception questionnaires for teachers and students to evaluate aspects of acceptability and ease of implementation of the circuit game model.

The data analysis was conducted using descriptive and inferential statistical methods. A paired sample t-test analysis was employed to compare locomotor skill scores before and after the intervention, while simple linear regression analysis was used to

identify the impact of circuit play on the development of students' locomotor skills. The results of the questionnaire were analyzed using descriptive statistics to evaluate the perceptions of teachers and students regarding the circuit play model.

This research method was chosen because it allows for a comprehensive evaluation of the feasibility of the circuit game model in enhancing students' locomotor skills. With a quasi-experimental design, this study can provide empirical evidence regarding the effectiveness of the intervention, while the quantitative approach ensures objectivity in data analysis. The results of this research are expected to make a significant contribution to the development of physical education learning strategies at the elementary school level.

FINDING AND DISCUSSION

RESULT

The research findings indicate a significant improvement in students' locomotor skills after participating in the circuit play program. The implementation of the circuit play was conducted over eight weeks with training sessions held twice a week. Each session lasted for 45 minutes and consisted of various locomotor activities such as running, jumping, and hopping through various obstacles designed according to the children's developmental levels.

Statistical analysis using the paired sample t-test showed that the TGMD-3 scores of the students experienced a significant increase ($p < 0.05$) after the intervention. The following are the results of the paired sample t-test:

Table 1. The Results Of Paired Sample T-Test.

Class	N	Mean Pre-test	Mean Post-test	Increase	t	p
Class 1	24	43.32	78.99	+35.68	-6.89	0.000
Class 2	29	46.18	74.83	+28.65	-7.21	0.000
Class 3	20	38.65	84.79	+46.15	-6.95	0.000

The table above shows the results of the paired sample t-test on students' locomotor skills before and after participating in the circuit play program for eight weeks. The data were analyzed based on the average scores from the Test of Gross Motor Development (TGMD-3), which measures students' locomotor abilities before the intervention (pre-test) and after the intervention (post-test).

The results of the analysis indicate that there is a significant improvement in the locomotor skills of students across all classes. In class 1, the average pre-test score was 43.2, while the post-test score increased to 78.99. The average increase of 35.68 demonstrates a considerable development in locomotor skills after participating in the circuit game intervention. The calculated t-value of -6.89 with a p-value of 0.000 indicates that the difference between the pre-test and post-test is highly significant ($p < 0.05$), thus it can be concluded that the intervention has a significant effect on the improvement of locomotor skills in class 1 students.

In the second grade, the average pre-test score was 46.18, while the post-test score increased to 74.83. The average increase of 28.65 also indicates a positive impact of the circuit game on students' locomotor skills. The results of the t-test showed a t-value of -7.21 with a p-value of 0.000, indicating that the improvement in locomotor skills among second-grade students is statistically significant. Similarly, in grade 3, there was an increase in scores from 38.65 (pre-test) to 84.79 (post-test), with an average increase of 46.15. The t-test analysis yielded a t-value of -6.95 with a p-value of 0.000, indicating a significant difference between the pre-test and post-test.

Table 2. Results of the Analysis of the Student Activity Observation Sheet

Observation Aspect	Average Activity (%)
Active involvement in every session.	85%
The ability to follow instructions	90%
Participation in motor challenges	88%
Social interaction during the game	92%

The results of the observation indicate that students exhibited a high level of activity during the circuit game. The majority of students were able to follow instructions well and demonstrated high engagement in each training session. Furthermore, social interaction among students also increased during the implementation of the circuit game, indicating that this method can assist in the development of social aspects in addition to motor skills.

Table 3. Results of the Analysis of the Teacher and Student Perception Questionnaire

Evaluation Aspects	Students (%)	Teacher (%)
Ease of understanding the game	87%	90%
The excitement in the implementation	92%	85%
Benefits for locomotor skills	89%	88%
Difficulties in implementation	15%	20%

Based on the results of the questionnaire, the majority of students and teachers assessed that the circuit game is easy to understand and enjoyable. More than 85% of students and teachers believe that this game provides significant benefits in enhancing locomotor skills. Although there are some challenges in implementation, the level of difficulty faced is relatively low, at only 15% for students and 20% for teachers, indicating that this model is feasible for application in physical education learning.

Based on the results, it can be concluded that circuit games are effective in enhancing the locomotor skills of lower-grade elementary school students. The higher score improvement in the higher grade (grade 3) indicates that children with more mature motor experiences are able to gain greater benefits from this intervention. These results also

demonstrate that circuit games are not only effective but can also be widely applied across various grade levels with consistent outcomes.

DISCUSSION

The results of this study indicate that circuit games can significantly enhance the locomotor skills of lower-grade students in elementary schools. These findings are consistent with the research conducted by (Lai et al., 2014), which states that circuit-based game models are effective in developing children's motor skills through a combination of physical exercises and interactive games. The significant improvement in locomotor skills across all classes suggests that this intervention is capable of providing an optimal stimulus for the motor development of young children.

Previous studies by (Hardy et al., 2012) also indicated that children's locomotor skills can improve with learning methods that involve active and varied movements. In this research, the greater improvement in grade 3 compared to grades 1 and 2 suggests that more mature motor experiences can accelerate adaptation to the provided exercises. The implications of these findings suggest that circuit play can be an integral part of the physical education curriculum in elementary schools. This game-based approach not only enhances motor skills but can also increase student engagement in physical learning in a fun and effective manner.

However, this study has several limitations, including a limited sample size restricted to one school, thus generalizing the results should be done with caution. Additionally, this research only measures locomotor skills, while other motor aspects such as manipulative skills have not been evaluated. Future research could expand the scope by involving more schools and examining other motor aspects to obtain a more comprehensive picture of the effectiveness of circuit games in the development of children's motor skills.

CONCLUSION

This research demonstrates that the circuit game model significantly enhances the locomotor skills of lower-grade students in elementary schools. With a significant increase in TGMD-3 scores following the intervention, it can be concluded that the circuit game model is an effective method that can be applied in physical education learning. The main contribution of this research is the provision of an evidence-based approach in the development of innovative and enjoyable learning strategies for students. Furthermore, this research offers recommendations for physical education teachers to integrate circuit games as part of the curriculum to enhance physical activity and motor skills in children from an early age.

As a suggestion, further research could expand the sample scope and consider the long-term aspects of the implementation of the circuit game model. In addition, further analysis regarding the influence of circuit games on other aspects such as learning motivation and student engagement in physical activities could also be a topic for future research.

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