Development of the Fusion Raceway Circuit Game to Improve Students' Fundamental Movement Skills

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- Abstract: Fundamental movement skills (FMS) are basic movement skills that children should acquire from an early age. Delays in acquiring these movement skills can affect children's ability to learn more complex skills in the future. This research, thus, aims to produce a product in the form of the Fusion Raceway Circuit game to improve the FMS skills of elementary school students. This research used a 4D research and development method, namely Define, Design, Development, and Disseminate. In developing the Fusion Raceway Circuit game, preliminary studies and information analysis, small-scale trials, revisions, and large-scale trials were carried out. After that, an evaluation was performed to determine the final result of the product being developed. The results of developing the Fusion Raceway Circuit game were product feasibility, reliability, and product effectiveness. Feasibility was obtained based on the validator's assessment, and a feasible result was obtained with the category of very good. Product reliability obtained a value of 0.868. The product effectiveness was also judged to be effective, as evidenced by an increase in the pretest-posttest results of 45.6% or the paired sample t-test with a significance value of 0.000. In conclusion, the product developed, the Fusion Raceway Circuit game, has been deemed feasible for dissemination to PJOK (Physical Education, Sports and Health) subjects, especially phase B students aged 8-10 years. Keywords: Circuit games, fundamental movement skills, motor skills, game development
- Abstrak: Keterampilan fundamental movement skills adalah keterampilan gerak dasar yang harus dimiliki anak sejak usia dini. Keterlambatan pemenuhan keterampilan gerak membuat dapat mempengaruhi kemampuan anak untuk belajar keterampilan yang lebih kompleks di masa depan. Penelitian ini bertujuan untuk menghasilkan produk berupa permainan Fusion Raceway Circuit untuk meningkatkan keterampilan FMS siswa sekolah dasar. Penelitian ini menggunakan metode penelitian pengembangan (research & development) 4D, yaitu Define, Design, Development, dan Disseminate. Dalam mengembangkan permainan Fusion Raceway Circuit, dilakukan studi pendahuluan dan analisis informasi, uji coba skala kecil, revisi, dan uji coba skala besar. Setelah itu dilakukan evaluasi untuk menentukan hasil akhir produk yang dikembangkan. Hasil pengembangan permainan Fusion Raceway Circuit adalah kelayakan produk, reliabilitas, dan efektivitas produk. Kelayakan didapatkan atas penilaian validator dan mendapatkan hasil yang layak dengan katergori sangat baik. Reliabilitas produk mendapatkan nilai sebesar 0.868. Efektivitas produk dinilai efektif dibuktikan dengan peningkatan hasil pretest-posttest sebesar 45.6% atau uji paired sampel t test dengan nilai signifinasi 0.000. Kesimpulan penelitian ini adalah bahwa produk yang dikembangkan yaitu permainan Fusion Raceway Circuit telah dinyarakan layak untuk disebarluaskan pada mata pelajaran PJOK khususnya siswa fase B berusia 8-10 tahun. Kata Kunci: Permainan sirkuit, Fundamental movement skills, motoric, pengembangan permainan

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INTRODUCTION

A ppropriate education is education that covers all areas, both knowledge and skills. Through education, a person can improve thinking (cognitive) and attitude (affective) and have good movement (psychomotor) abilities. Proper education can help students understand the importance of physical activity. Understanding basic movements or Fundamental Movement Skills (FMS) is best given to young children. At this age, children begin to know and practice movement activities. Longmuir et al. (2017), in the research "Canadian Agility and Movement Skill Assessment (CAMSA)," stated that children with sufficient understanding of physical literacy could have an impact on better and optimal movement activities. In contrast, children with low physical literacy will move more slowly to perform movement activity skills.

Fundamental Movement Skills (FMS) are basic movement skills that involve general human body movements. This skill is the basis for developing motor skills from easy or simple movements to difficult or more complex movements (Bolger et al., 2021). FMS is divided into basic locomotor movements, stability movements (non-locomotor), and manipulative movements (Indahwati, 2023). Children aged 8-10 years should understand the variations and combinations of FMS. However, in today's era, many children have difficulty practicing movement skills. In this case, physical education (PJOK) in schools has a central role in students' understanding of physical activity and the development of students' FMS or basic movements (Fitron, 2020). It is expected that the teaching modules designed by the government can have a good impact on the development of students' FMS. Following that, the learning guide prepared as Learning Outcomes (CP) becomes a guideline that must be followed in designing games that can develop students' FMS. Moreover, movement skills play an important role in children's motor development. By strengthening basic movement skills, such as running, jumping, and throwing, children can develop their coordination and fine motor skills. Therefore, it is very necessary to emphasize movement skills in physical education learning.

Physical education learning is a learning process that has been structured systematically to achieve fitness goals through physical activity to develop students' basic movement and motor skills (Ulfah et al., 2021). Here, three aspects of learning in schools become teachers' assessments of students' abilities, namely cognitive, affective, and psychomotor. Cognitive is an ability related to a person's thinking intelligence, affective is something related to daily attitudes and behavior, and psychomotor is an aspect associated with movement skills. Delays in acquiring these movement skills can hinder a child's ability to participate in physical activities, sports, and games with their peers. Therefore, it is necessary to implement movement skills material in PJOK subjects.

According to Liu and Chen (2021), physical education in schools aims to develop students' movement skills and increase physical literacy, namely understanding the importance of physical activity for a healthy life. Caldwell et al. (2020) added that physical literacy involves understanding how to maintain fitness through regular physical activity. In the learning context, Luguetti and Oliver (2017) explain that this process is the transfer of knowledge from teachers to students to develop thinking patterns and improve students' abilities and skills as a whole. Thus, learning PJOK at school contributes to students' academic and non-academic aspects. Success in achieving satisfactory learning outcomes will contribute to the optimal achievement of learning objectives (Sulaiman, 2023). Physical literacy is not only about teaching movement or play skills but also about empowering students with in-depth knowledge about their bodies, physical activity, and overall health. Physical learning provides opportunities for students to develop an understanding of the importance of physical fitness, motor skills, and healthy behavior.





To achieve PJOK learning objectives, teachers can use appropriate learning media. Learning with the right media can increase students' enthusiasm for participating in learning. According to Cahyo (2019), apart from being useful as a channel of information from teachers to students, media is also useful for teachers as a guide in preparing creative learning models. The aim is to make it easier for students to digest the material that the teacher will present. Students will like learning something new if the lessons given at that time feel fun and encouraging (Hasanah, 2016). Facts in the field have proven that using interesting and fun game media can raise enthusiasm and attract students' interest in participating in physical education lessons.

The use of games to improve movement skills is widely supported by the results of previous research that has been carried out. Like research (Aristianti et al., 2022), which applied circuit games to improve locomotor skills in children aged 4-5 years, the results showed that circuit-based games could improve gross motor skills in children aged 4-5 years. In another study by Khasanah and Sutapa (2018), a circuit-based game was developed, which was useful in improving movement skills or FMS in early childhood. This development research provides the conclusion that the game product developed has been effective in improving the basic movement skills of early childhood with evidence of a difference in the results of the 2-tailed significance value of 0.00, indicating a difference between the pretest and posttest after being given treatment.

Wahyuningtyas and Sulasmono's (2020) research also concluded that teachers' use of learning media can help students understand lesson material so they can achieve good learning outcomes. Another finding regarding the benefits of learning media was revealed by Erfayliana et al. (2022) concerning the development of Articulate Storyline-based media in PJOK learning and concluded that the media used was declared very feasible and able to help students be more effective and efficient in receiving knowledge. In their growth, elementary school-age children can develop quickly if they learn while playing. Games packaged in an interesting and fun way will impact cognitive, physical, mental/psychological, and spiritual development (Petrie & Clarkin-Phillips, 2018).

Holistically, games can be integrated into education according to the needs and goals to be achieved. Educators or teachers can design games that are specifically designed to develop the movement skills they want to improve (Reswari, 2021). Integrating games into physical education, sports, and health (PJOK) subjects can be an effective strategy for improving children's movement skills. By designing games that are relevant, fun, and oriented toward learning goals, physical education teachers can effectively improve children's movement skills while promoting a healthy and active lifestyle.

Therefore, this research aims to develop a game called Fusion Raceway Circuit. This research is the development of a circuit game to improve the FMS skills of elementary school students aged 8-10 years. Fusion Raceway Circuit is a form of playing activity packaged in the form of a fun game by dividing the number of six posts to be completed. The Fusion Raceway Circuit game aims to improve FMS skills through the activities carried out. This game is highly suitable for early childhood because, basically, children at that age like playing and competing. Playing while learning will stimulate children to focus on what they are doing, whereas if they learn while playing, children will focus on learning, as stated by Suyadi (Sihite, 2021). The novelty of this research is the development of a game specifically aimed at improving FMS skills and an approach to combining aspects of learning and play in the learning process. In previous literature, there have been several games or activities aimed at improving these skills. However, the Fusion Raceway Circuit provides a specific and structured approach to improving these skills. This research contribution is also beneficial for all parties in the context of early childhood education and development.



RESEARCH METHODS

This type of research is development (Research and Development). Development research aims to dev This research is development research. Development research has the aim of producing a product or improving an existing product. This development research used the 4D method. In the book entitled "Instructional Development for Training Teachers of Exceptional Children," related to Thiagarajan's (1974) 4D method, it is stated that research is used to produce a learning product in which there are four stages: Define, Design, Develop, and Disseminate. Explicitly, this development research produced a product, namely a form of circuit game, to improve elementary school students' FMS, including basic locomotor, non-locomotor, and manipulative movements.

The development stages were as follows: 1) Define, which consisted of observation and interviews. The researchers carried out the analysis and collected information from teachers and schools involved in the process of developing circuit games. 2) Design: at this stage, the researchers designed a circuit game called Fusion Raceway Circuit, comprising six posts that contained elements of FMS skill movements. 3) Development consists of expert validation and product testing. This stage obtained the validity and reliability of the circuit game form. The validation process was conducted based on the assessment of learning media experts, learning material experts, and practitioners (PJOK teachers). 4) Disseminate, where this stage is the final form of the product that could be disseminated to the community, especially to elementary school-age children.

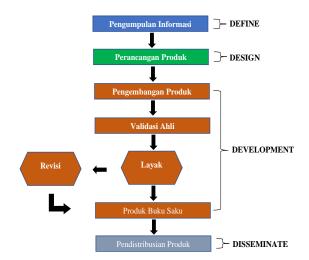


Figure 1. 4D development research method

The subjects in this research were fourth-grade students at SDN Balongsari 4 and SDN Balongsari 5. In this phase, students were aged 8-10 years. Sampling was done using custom random sampling. The instrument employed in this research was a needs assessment instrument, namely a validator assessment. The feasibility assessment was carried out by learning media experts and learning material experts. The validator's assessment consisted of a) suitability of the material, b) depth of content, c) creativity of the material, d) suitability of illustrations, and e) relevance of needs.

The data analysis technique in this research utilized both qualitative and quantitative data. Qualitative data were obtained from interviews with PJOK teachers' needs analysis as well as validator input and suggestions regarding the games being developed. On the other hand, quantitative data were gathered from the results of validator assessments and field trials. Data analysis techniques were then





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obtained from validator assessment instruments. To facilitate deduction, the results of the percentage analysis were classified based on the percentage data obtained. The interpretation and categorization techniques used are as follows:

Category	Percentage	Qualification
4	80-100%	Very good
3	60-79%	Good
2	50-59%	Less good
1	0-49%	Not good

Table 1. Percentage of product qualifications

Source: Cahyo in (Akbar, 2013)

RESULTS AND DISCUSSION

To determine the feasibility of the product being developed, the validators tested the feasibility of the product through validation using a researcher-made assessment scale. Validator assessment with a value scale became the basis for determining product suitability. The assessment had a range of values: (5) strongly agree, (4) agree, (3) fair, (2) somewhat agree, and (1) disagree. Validators assessed products by referring to indicators determined by the researchers. The results of the validator assessment process used a value scale as a reference material to determine product suitability. The following is the validator assessment table.

No	Validator	Competence	Validation	Percentage	Follow-up
1.	Learning media	Lecturer at	Instructional	77%	Feasible with
	expert	Masters in Sports	media		revisions
		Education, Unesa			
2.	Learning	Lecturer at	Learning	75%	Feasible with
	materials	Masters in Sports	materials		revisions
	expert	Education, Unesa			
3.	Practitioner	PJOK teacher at	Correspondence	81%	Feasible
	(PJOK teacher)	SDN Balongsari	of theory and		without
		4	practice		revision

Table 2. Validation of the feasibility of the Fusion Raceway Circuit game form

Assessment or validation consisted of learning media experts, learning material experts, and practitioners (PJOK teachers). Analysis of the results from learning media experts regarding the feasibility of the product being developed showed that the form of this circuit game was declared or categorized as "good" in terms of the learning media used. This was proven by obtaining a percentage value of 77%. Therefore, the Fusion Raceway Circuit game was declared feasible for use with revisions. Feasibility assessment by learning materials experts revealed that the game product developed was also declared "good," with a percentage score of 75%. Therefore, the game developed was considered feasible for use with revisions. Meanwhile, in the practitioner (PJOK teacher)

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assessment, the game product developed was declared "very good" with a percentage score of 81% (63/80 x 100% = 81%). Therefore, the game developed was deemed feasible for use.

Score	core Category Meani		Total	
>80	Very good	Very good Passed		
60-79	Good	Good Passed		
40-59	Enough	Enough Not pass		
20-39	Not enough	Not enough Not pass		
<20	Very less Not pass		0	
	The number of students			
Nun	Number of students who passed			
Numb	Number of students who did not pass			

Table 3. Small scale trials

The data above explains the results of small-scale trials on students, showing 12 students who scored between 60 and 79 in the "Pass" category. Furthermore, eight students got scores between 40 and 59, and they were declared "Not Passed" because it was categorized as enough. Meanwhile, for a score of 80 or more, not a single student was in that category. Out of the total number of 20 students who were test subjects, 12 were declared to have passed, while eight other students were declared not to have passed. From the analysis of small-scale trials, the researchers carried out evaluations and consultations with supervisors to improve the product before trials were carried out on a larger scale.

Score	Category	Meaning	Total	
>80	Very good	Very good Passed		
60-79	Good	Passed	26	
40-59 Enough		Not pass	18	
20-39	Not enough	Not pass	0	
<20	Very less Not pass		0	
The number of students			56	
Number of students who passed			38	
Number of students who did not pass			18	

Table 4. L	arge so	ale trials
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The final trial results involved all grade 4 phase B students or children aged 8-12 years. Based on the data obtained in the table, it can be explained that 12 students achieved scores above 80 and passed in the "very good" category. 26 students got a score between 60 and 79 in the "Pass" category. Furthermore, 18 students got a score between 40 and 59, and they were declared "Not Passed" because they were in the "Enough" category. Of the total number of 56 students, 38 were declared "Passed," while 18 other students were declared "Not Passed." Analysis on a larger scale provides researchers with a broader picture of products that are feasible for use and dissemination but still take into account several inputs and suggestions from supervisors.





After passing trials and revisions and having completed the analysis of feasibility test results from expert validation in the field, a reliability test was carried out to prove that the product being developed could be used sustainably (reliable). Reliability testing was carried out using test-retest analysis. Repeated test results (test-retest) are one way of conducting reliability testing, where respondents are given the same test but at different times (Maksum, 2018). The results of the reliability test are as follows.

Ţ	Table 5. Reliability test					
	Cronbach's					
	Alpha Based					
	on					
Cronbach	Cronbach's Standardized					
Alpha	Ite	ms	N of Items			
	368	.884	2			

In the reliability analysis above, a Cronbach's Alpha value of 0.868 was obtained. This value denotes that the research instrument has been said to be reliable in the very good category. By obtaining a Cronbach's Alpha of more than 0.80, it can be concluded that the product being developed had excellent constancy or reliability. With the explanation and explanation of the results of the data analysis, the development of the Fusion Raceway Circuit game was feasible for use and dissemination to the public.

Group	Mean	Std. deviation	t	df	Sig	Description
Pair pre-post	-25.339	5.943	-31.907	55	0.000	Significant

The paired sample t-test on the sample was carried out to determine the effectiveness of the Fusion Raceway Circuit game. Based on the results of paired samples t-test data analysis with the help of the IBM SPSS 25 application, a comparison between before (pre) and after (post) tests could be made. The mean difference between the pretest and posttest was -25.339, with a standard deviation of 5.943. The significance result was 0.000 < 0.05, smaller than the minimum standard of 0.05. Therefore, in conclusion, in the circuit game developed, there was a significant increase in results after intervention or treatment was carried out on the subjects and had a significant impact on the variables measured, which was reflected in the difference in results between the pretest and posttest conditions.

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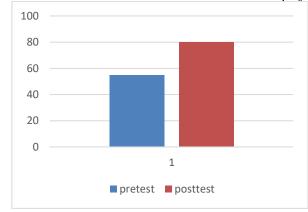


Figure 1. Pretest-posttest results

This form of development of the Fusion Raceway Circuit game obtained feasibility (valid) and consistency (reliability) results. In the feasibility analysis, this development research used assessments from validators regarding the content of the form of the game being developed. The results obtained from media expert validation were 77%, the assessment from material experts was 75%, and the assessment from PJOK practitioners was 81%. Based on this assessment, it can be concluded that the product being developed was feasible for use with revisions in the form of input or suggestions from the validators. Meanwhile, the reliability test employed a repetition test (test-retest) with a Cronbach's Alpha result of 0.868. The results showed that the product developed was stable or reliable because Cronbach's Alpha value was greater than the minimum requirement of > 0.6. Thus, in conclusion, the product developed could be said to be valid and reliable.

Furthermore, another success in product development in the form of the Fusion Raceway Circuit game as a physical education learning medium could be explained by its effectiveness on the sample, namely that of elementary school students in phase B or with an age range of 8-12 years. In terms of effectiveness, the development of the Fusion Raceway Circuit game form was obtained from the difference or increase in the pretest and posttest results of the subjects studied, with a percentage increase of 45.6%. Overall, the game developed met the feasibility requirements with the feasibility results obtained from the assessment of validators by media experts, material experts, and practitioners (PJOK teachers). In addition, product reliability received a fairly reliable title with a Cronbach Alpha value of 0.868, categorized as very good.

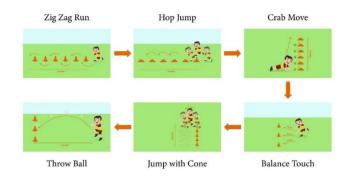


Figure 2. Fusion Raceway Circuit game form





The development of the Fusion Raceway Circuit game is a research development in the field of physical education, where fun games are packaged in the form of circuits. This game is divided into several posts which have different movement tasks and aim to improve elementary school students' Fundamental Movement Skills (FMS) skills. The Fusion Raceway Circuit game consists of six posts, where the six posts are divided into post 1: zigzag run, post 2: hop jump, post 3: crab move, post 4: balance touch, post 5: jump with cone, and post 6: throw ball. Two groups play this game, each group focusing on its obstacles and trying to go as fast as possible through each existing post. This game was designed in such a way that it took into account the characteristics of children in accordance with the development level of elementary school students in phase B, especially in fourth-grade elementary school.

As mentioned before, this game has two groups, each facing their set of obstacles (posts 1 to 6). Each group will prioritize their obstacles and strive to navigate through each post as quickly as possible to accumulate points. Every post comprises three points, and there are a total of six posts, resulting in a maximum value of 18 points per student. This game was specifically intended to cater to the developmental needs of primary school students in phase B, particularly those in the fourth grade.

This research is consistent with the results of previous research by Pertiwi (2019), who developed a circuit game to improve basic locomotor, non-locomotor, and manipulative movements using the Borg & Gall method. Her research produced a learning device based on circuit games to improve the movement skills of children with special needs. The results of her development research are that the product for developing adaptive physical education circuit learning models for children with Down syndrome was in the very good category. The results of this research are relevant to this research, resulting in a functional and useful product for students to improve basic movement abilities and skills through interesting games for students, namely circuit games.

Finally, the circuit game developed was deemed feasible for use by young children. With the development of technology in the current era, learning requires innovation that attracts students' attention. The existence of games that combine innovation and technology in the form of creative and innovative media can help students achieve their needs and movement skills to fulfill their daily activities. On the other hand, this research is useful for teachers who are interested in alternative learning in PJOK subjects.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of research on the development of the Fusion Raceway Circuit game form to improve the FMS skills of elementary school students, it can be concluded that the circuit game developed is feasible for implementation in physical education subjects in phase B elementary schools or for children aged 8-10 years. The Fusion Raceway Circuit game has also met the validity and reliability requirements in the product development process, and this game is feasible for use with elementary school-age children.

The product developed, namely the form of the Fusion Raceway Circuit game resulting from this research, can be used as an alternative and option for PJOK teachers and trainers to teach games that aim to hone FMS skills or basic movements. Some suggestions that the researchers can convey regarding product use include that 1) It is expected that the development product can be used by schools that want to implement it; 2) The Fusion Raceway Circuit game can be developed again in the future with a broader domain, measuring not only the FMS aspect but also other supporting aspects,

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such as motivation, self-confidence, self-belief, and other aspects, which support the development of elementary school-aged children.

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