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The Effectiveness of Roller-Track Media in Improving the Back Roll Ability of Elementary School Students

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ABSTRACT

The purpose of this study was to examine how the use of Roller-Track media can help elementary school students improve their backward roll skills. The background of this study stems from the fact that backward rolls are a common problem faced by students due to limited body coordination, fear, and a lack of mastery of the correct technique. The research methodology used a pre-experiment and a one-group pretest-posttest design, involving 60 fifth and sixth-grade students at SDN Besowo Elementary School in Jatirogo District, Tuban Regency. Data were obtained through a back roll skill assessment sheet. The results showed that students' backward roll skills improved after being given treatment with the Roller-Track media. The average backward roll ability score increased by 9.43 points from 63.28 on the pretest to 72.71 on the posttest, resulting in a significance value of $p = .001$ ($p < .05$). In addition, the number of students in the poor and very poor categories decreased, while the number of students in the very good and good categories increased. By utilizing the Roller-Track media, it can be concluded that elementary school students' backward roll skills improved significantly. This media helps students overcome technical and psychological challenges, so it can be used as an alternative for innovative, safe, and practical floor gymnastics learning methods in elementary schools.

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INTRODUCTION

Physical education in elementary schools develops basic motor skills, sportsmanship, and healthy lifestyles in children. One of the subjects taught is floor exercises, which include coordination, flexibility, and courage. Backward rolls are one of the basic skills in floor exercises that are still considered difficult by elementary school students because they require a combination of balance, courage, and proper technique. Based on the researcher's observations at Besowo Public Elementary School, many students feel that doing a backward roll is difficult. They may be afraid of falling, have the wrong body position, or make mistakes when supporting their head and shoulders. This

has led to the need for innovative learning media to help students master this skill more effectively and enjoyably.

Previous studies have shown that the use of media in learning can improve students' ability to perform movements. Alaya & Tresnowati (2025) argue that warming up with stretching can reduce the risk of injury in forward and backward roll skills. Anggriawan et al. (2020) developed interactive multimedia learning for forward and backward rolls, which proved effective in supporting students' understanding of these movements. In addition, cooperative learning approaches such as STAD and TGT have also been shown to contribute to improving floor gymnastics learning outcomes, including backward rolls, according to (Fadillah et al., 2021; Fitriani et al., 2024; Mubaroq et al., 2023). Other studies focus on psychological aspects, where self-confidence and flexibility influence success in performing backward rolls, according to Gunadi et al. (2023).

Innovative approaches such as the game method (Hadyansah, 2021), inquiry model (Isnaini, 2023), problem-based learning (Mualimin et al., 2022), and scientific learning with Number Head Together (Rahim, 2023) have been proven to increase students' motivation and floor exercise skills. Other opinions emphasize the importance of modifying media, such as the use of mats (Pratiwi et al., 2022; Syam et al., 2024) or audio-visual media (Pujiyanti et al., 2024; Sidiq & Suharjana, 2023) to support learning the backward roll. Improving basic backward roll skills in elementary school students requires learning media and methods that are appropriate for children's characteristics (Pangkey & Mahfud, 2020; Yuliandra et al., 2020).

Most studies still focus on the application of general learning methods, or multimedia, while the use of Roller-Track media as a specific tool for teaching backward roll skills to elementary school students has rarely been studied.

Repetition, reduction of obstacles, and selection of appropriate media for specific movements greatly influence the effectiveness of physical skills in motor learning theory. Roller-Track media has the mechanical ability to start rotation more easily, is not afraid of distance, and receives gravitational assistance, thereby supporting backward rolling. This is consistent with the findings of Rusdin et al. (2021), who argue that strengthening backward rolling skills requires a variety of exercises. Saputra et al. (2024) state that the basic technical approach must consider the physical and mental conditions of beginner athletes. Students benefit psychologically from using the Roller-Track, which not only provides technical assistance but also reduces fear and barriers to movement.

This study has different characteristics compared to previous studies, specifically evaluating the effectiveness of using Roller-Track media in teaching backward roll skills to elementary school students. Previous studies focused on learning models and the use of audiovisual or multimedia. For example, game-based methods (Hadyansah, 2021), inquiry models (Isnaini, 2023), problem-based learning (Mualimin et al., 2022), scientific methods using Number Head Together (Rahim, 2023), the use of audio-visual media (Pujiyanti et al., 2024; Sidiq & Suharjana, 2023), and the use of interactive multimedia (Anggriawan et al., 2020). This study offers a more practical method that directly supports the backward roll movement using Roller-Track media. This study plays an

important role in finding real solutions to the problems faced by students. In addition, this study will help physical education teachers in providing alternative media that is easy to use, efficient, and effective in schools. Therefore, this study contributes to the field of pedagogy and the methodology used to develop sports learning media.

The shortcomings of the research are evident in the lack of empirical studies that specifically discuss the use of Roller-Track media to overcome the problem of backwards rolling in elementary school students. Existing research still focuses on the use of traditional methods, such as direct teaching by teachers (Surya et al., 2024), variations in exercises (Rusdin et al., 2021), and game-based approaches (Hadyansah, 2021). This study offers innovation by applying Roller-Track as a new medium that is suitable for students' physical conditions, utilizes the law of gravity, and reduces psychological barriers. This study also provides empirical evidence of how effective the Roller-Track medium is in improving backward roll skills, and also provides references for practical teaching approaches that can be applied by physical education teachers to elementary school students.

The purpose of this study was to assess how the use of Roller-Track media affected elementary school students' ability to perform backward rolls. In addition, this study aimed to determine the extent to which Roller-Track media could support students in overcoming technical and psychological obstacles when performing backward rolls, and to assess its effectiveness as a learning media option for floor exercises in elementary schools.

METHODS

This study used a pre-experimental method with a quantitative approach and a One Group Pretest-Posttest design. This design was chosen to test changes in learning outcomes before and after treatment without the need for a control group (Muhandis & Riyadi, 2023; Tandiola et al., 2024). This approach is considered effective in an educational context, especially when researchers cannot fully control external variables but still want to test the effect of a treatment on learning outcomes (Asrin, 2022; Sutono & Pamungkas, 2021).

To determine the students' initial ability in backward rolls, the research subjects were given a pretest (O_1) before the treatment (X), which was an exercise using the Roller-Track media. After the treatment, the research subjects were given a posttest (O_2) to measure the results. The difference between the O_1 and O_2 scores indicates the effect of the treatment (Purba, 2021). The formula $O_1 \rightarrow X \rightarrow O_2$ shows the research design. The results of this design were used to determine the extent to which the use of the Roller-Track media affected elementary school students' ability to perform backward rolls.

Every child enrolled in physical education classes at Besowo Public Elementary School in Jatirogo Subdistrict, Tuban Regency, constituted the population of this study. Purposive sampling was used to select the research sample, which was chosen based on specific criteria or standards that supported the research objectives (Susilowati et al., 2024). Samples from students in grades V and VI were used for this study because at that level, students have a higher level of motor coordination, courage, and ability to

understand instructions compared to lower grades. These conditions make fifth and sixth-grade students the most suitable group for learning floor gymnastics skills such as backward rolls, thus meeting the needs of the study.

The sample consisted of 60 students, comprising 37 males and 23 females. This number represented all students in the class who met the selection criteria based on purposive considerations. The selection of this number took into account the effectiveness of the experiment in learning and the availability of students in the selected class. Fifth and sixth-grade students who were actively involved in PJOK learning met the inclusion criteria for this study and had no history of back or neck injuries that could hinder the implementation of the backward roll movement.

The research instrument used in this study was a backward roll skill test developed by (Bayuntoro, 2015). The test was used to assess students' backward roll skills before and after treatment. The three main components of the backward roll gymnastics skill assessment rubric, consisting of the initial movement, execution movement, and final movement, form the basis of this assessment. Based on research (Bayuntoro, 2015), the instrument used is valid and reliable, with a validity coefficient of 0.798 and a reliability coefficient of 0.753. As explained by Dahri (2020), the principle of quantitative measurement is used in physical education research, which means that interval and ratio scales can be used to measure and objectively assess physical performance.

The research steps were carried out systematically to produce reliable and scientifically accountable findings. The first stage was research preparation, which included conducting preliminary studies at schools to determine the initial conditions of students in performing backward rolls, developing observation instruments and assessment sheets, and obtaining research permits from schools and physical education teachers.

In the second stage, known as the pretest, the children's initial ability to perform backward rolls was assessed before treatment was given. Assessment at this stage was carried out by two observers to maintain the objectivity of the results.

The third stage was treatment. At this stage, students were given backward roll training using Roller-Track equipment. During training, researchers provided technical instructions and corrected students' body positions, and students performed the exercises repeatedly. To observe changes in student performance and improve their confidence, researchers conducted direct observations during the learning process.

The fourth stage is the posttest, which is conducted after all treatments are completed. At this stage, students are tested again on their backward roll ability without the aid of the Roller-Track. The level of improvement in backward roll ability after treatment is then assessed by comparing the pretest and posttest results.

The pretest and posttest results were entered into the analysis table in the final phase, namely data analysis and reporting, then a normality test was conducted, followed by a t-test (paired sample t-test) to determine whether there was a significant difference between the results before and after the treatment. The findings are presented in the form of graphs, tables, and statistical interpretations to help draw conclusions. The

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principles of experimental research, as explained by (Asrin, 2022), state that each stage of research must be carried out systematically so that the results are valid and can be generalized scientifically.

Descriptive and inferential statistics are used to analyze data. The mean, standard deviation, minimum value, and maximum value of students before and after treatment are determined using descriptive analysis. Data characteristics can be described using descriptive statistics (Arsi, 2020; Dahri, 2020). To determine whether there was a significant difference between the pretest and posttest findings, inferential analysis was performed using a paired sample t-test. (Fuadi et al., 2022; G. Y. Saputra et al., 2022). The decision criterion was that if the p-value was less than 0.05, there was a significant difference, indicating that the Roller-Track media improved students' backward rolling ability; if p was greater than 0.05, there was no significant difference. The significance level used was $\alpha = 0.05$. SPSS version 31 software was used to analyze the data extensively. This was done to ensure that the calculation results were accurate, effective, and objective. Statistical software helps researchers avoid manual calculation errors and increases the validity of inferential analysis results.

This study involved several students and was conducted in accordance with ethical principles of educational research. Permission to conduct the study was obtained from the school. All participants participated voluntarily, and data were kept confidential.

RESULTS AND DISCUSSION

Result

Sixty students in grades V and VI enrolled in physical education classes at SDN Besowo, Jatirogo District, Tuban Regency, participated in this study. Each student was given a backward roll skill test before (pretest) and after treatment (posttest) using Roller-Track media. Back roll ability data was collected based on an assessment rubric covering three main movement aspects, with a maximum score of 9 and a value of 100. Changes in learning outcome categories can also be seen in Table 1.

Table 1.
Distribution of Backwards Roll Ability Categories

Category	Score Range	Pretest (n / %)	Posttest (n / %)
Very Good	86-100	5 (8.3%)	11 (18.3%)
Good	76-85	5 (8.3%)	10 (16.6%)
Fair	66-75	18 (30%)	24 (40%)
Poor	56-65	18 (30%)	11 (18%)
Very Poor	<56	14(23.3%)	4 (6.6%)

Table 1 shows a significant increase in the number of students who met the good and very good categories, from 10 students (16.6%) to 21 students (34.9%) and students in the fair category from 18 students (30%) to 24 students (40%) after participating in training with the Roller-Track media. Meanwhile, the number of students in the poor and very poor categories decreased from 32 students (53.6%) to 15 students (24.6%).

Table 2.
Descriptive Statistics of Pretest and Posttest Results

Statistics	Pretest	Posttest
Mean	63.28	72.71
Standard Deviation	15.42	12.31
Minimum Value	31.00	89.00
Maximum Value	50.00	92.00

Based on Table 2, the average value of students' backward roll ability increased from 63.28 to 72.71 after the treatment using the Roller-Track media. This shows an average increase in skill of 9.43 points. In addition, the data distribution in the posttest was more homogeneous (SD = 12.31) than in the pretest (SD = 15.42), indicating an increase in performance consistency among students.

Table 3.
Results of Data Normality Test

Test Type	Variable	Test Statistics	Sig. (*p*)	Description
Kolmogorov-Smirnov	Pretest	.097	.200	Normally distributed data
	Posttest	.100	.200	Normally distributed data

The pretest (p = .200) and posttest (p = .200) data show that the significance value is greater than (> .05) according to the Kolmogorov-Smirnov test, which indicates that the data are normally distributed and meet the requirements for the paired sample t-test.

Table 4.
Results of the Paired Sample T-Test

Variable	Mean Difference	*t*-count	*df*	Sig. (2-tailed)
Pretest posttest	-9.43	-12.05	59	.001

Based on the analysis results in Table 4, the ($t(59) = -12.05$, p = .001). This indicates that there is a significant difference between the pretest and posttest results. Thus, it can be said that the use of Roller-Track media significantly improves the backward roll ability of elementary school students.

Discussion

According to the research findings, the use of Roller-Track media significantly improved the backward roll ability of elementary school students. The average score increased by 9.43 points from 63.28 on the pretest to 72.71 on the posttest, according to the analysis calculations. The paired sample t-test showed a significant value of p = .001 (p < .05). Therefore, the research hypothesis that Roller-Track media affects students' backward roll ability can be accepted.

Both the average score and the distribution of learning outcome categories show an improvement in backward roll skills. While students in the good and very good categories showed significant progress, students in the poor and very poor categories experienced a significant decline. The results show that the Roller-Track not only improves the performance of students who are already quite good, but also helps students who previously had difficulty performing backward rolls.

These results are consistent with the principles of motor learning, which state that if biomechanical and psychological barriers are reduced, motor skills will be easier to

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learn. Students find it easier to initiate backward rotation because the Roller-Track medium uses gravity and an inclined plane. These conditions help students avoid technical errors such as a lack of momentum when rolling, incorrect head position, and failure to lift the pelvis. These results support (Rusdin et al., 2021; G. Y. Saputra et al., 2022) that improvements in backward roll skills are greatly influenced by adjustments and variations in exercises.

In addition to technical benefits, the use of Roller-Track also helps students psychologically, particularly by reducing fear and increasing their self-confidence. Roller-Track makes students more courageous in performing back rolls because they are afraid of falling or supporting their head and neck incorrectly. This is consistent with research by (Gunadi et al., 2023), which found that self-confidence and mental state are very important for successfully performing backward rolls.

The results of this study also expand on the findings of previous studies that focused more on learning models and audiovisual media. Previous studies, such as the game method (Hadyansah, 2021), inquiry model (Isnaini, 2023), problem-based learning (Mualimin et al., 2022), and the use of interactive multimedia (Anggriawan et al., 2020) have been proven to successfully increase student enthusiasm and understanding. This study shows that physical media with a mechanical basis, such as Roller-Track, are effective in increasing enthusiasm and understanding and can be a more efficient alternative because they target technical aspects and courage, which are the main difficulties students face in performing backward rolls.

From a pedagogical perspective, Roller-Track media is well-suited to the needs of elementary school students who require concrete, safe, and enjoyable learning experiences. Roller-Track media allows students to learn through direct experience, which has been proven effective in physical education. In addition, Roller-Track media can be used in regular learning without the need for sophisticated technology, making it very useful for elementary schools.

Although the research findings show a significant effect, this study did not have a control group and only used a single-group pretest-posttest design. Therefore, further research should use a more reliable experimental design, such as an experimental design with a control group, to better understand its effectiveness. In addition, the research should combine Roller-Track with a specific learning model.

Overall, the findings of this study indicate that Roller-Track equipment helps elementary school students improve their backward roll skills both technically and psychologically. The results of this study are expected to help physical education teachers make more innovative, safe, and developmentally appropriate choices for their students.

CONCLUSION

These findings indicate that the use of Roller-Track equipment has a significant impact on improving elementary school students' backward roll skills. The average backward roll skill score increased from 63.28 on the pretest to 72.71 on the posttest,

which was supported by the results of a paired t-test with a significance value of $p = .05$. These results indicate that Roller-Track media is useful in improving students' backward roll ability while also improving floor gymnastics teaching standards because it not only provides quantitative contributions but also helps students overcome technical challenges such as starting rotation, maintaining proper body position, and coordinating movements. However, this study still has limitations because it uses a single-group pretest-posttest design without a control group. It is recommended that further research be conducted using a more robust experimental design and combining the use of Roller-Track with specific learning models so that the research results are more comprehensive and can be generalized more widely.

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