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Application of Floor Tape Media to Improve Psychomotor Ability: Cartwheel Movement Floor Exercise at Elementary School

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ABSTRACT

This study aimed to examine the effectiveness of floor tape as a visual learning aid in improving primary school students' psychomotor abilities in performing the cartwheel movement in floor gymnastics. The research was conducted using a quantitative approach with a one-group pretest–posttest design. The participants consisted of 25 fifth-grade students from SD Negeri 1 Mojorembun, selected through purposive sampling due to their limited prior exposure to structured floor exercise learning. Data were collected using observation sheets, questionnaires, and cartwheel performance tests that assessed key psychomotor components, including movement accuracy, coordination, balance, and body orientation. The intervention involved the use of floor tape arranged as movement pathway guides to assist students in understanding the direction, rotation pattern, and spatial orientation of the cartwheel movement. Data analysis using a paired-sample t-test revealed a statistically significant improvement in students' psychomotor performance between the pretest and posttest phases ($p = 0.000 < 0.05$). These findings indicate that the application of floor tape media effectively enhanced students' ability to perform the cartwheel movement. The results suggest that floor tape serves as an effective non-digital visual cue that supports motor learning by clarifying movement trajectories, reducing cognitive load, and providing a safe and gradual learning progression. This media is particularly beneficial in elementary schools with limited infrastructure, as it is simple to implement, cost-effective, durable, and environmentally friendly. In conclusion, floor tape-based visual guidance represents an innovative and practical instructional solution for improving fundamental motor skills in floor gymnastics. The study contributes to the development of context-based physical education learning by offering an alternative teaching medium that is accessible, sustainable, and pedagogically effective for resource-constrained school settings.

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A. Conception and design of the study;
B. Acquisition of data;
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INTRODUCTION

Physical Education, Sports, and Health (PJOK) plays a strategic role in developing physical fitness, motor skills, and character in students from an early age. Through structured physical activities, PJOK contributes to the integrated development of students' psychomotor, cognitive, and affective aspects (Bailey et al., 2009; Kirk, 2013). One of the key topics in elementary school PJOK is floor gymnastics, which requires

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mastery of coordination, strength, flexibility, balance, and spatial orientation (Logan et al., 2012; Gallahue et al., 2019). The cartwheel is a basic floor gymnastics skill that serves as a foundation for mastering more advanced gymnastics skills.

However, the implementation of floor gymnastics learning in elementary schools still faces various obstacles, particularly in schools with limited facilities and infrastructure. Based on researchers' observations at SD Negeri 1 Mojorembun, PJOK learning has not been optimal due to a lack of adequate facilities, tools, and learning media. This situation often leads teachers to use a simple game approach without media support, so students rarely receive a comprehensive and systematic floor gymnastics learning experience. Consequently, most students are unable to perform the cartwheel movement correctly, and many have never been introduced to this skill.

The limited availability of learning media also results in a lack of variety in learning activities, monotonous learning, and a lack of support for optimal student psychomotor development. Effective movement learning requires safe and directed visual and kinesthetic stimulation, as well as hands-on experience (Rink, 2014; Schmidt & Lee, 2019). Therefore, innovative learning media that are simple, affordable, safe, and easy to implement are needed to help students gradually understand the cartwheel movement pattern, especially in elementary schools with limited resources.

Various studies have been conducted to improve the quality of floor gymnastics and cartwheel skills learning. Most recent studies have focused on the use of digital technology and interactive multimedia, such as Adobe Flash (H. et al., 2022), Articulate Storyline (Agustin & Kurniawan, 2021), interactive multimedia (Zamani et al., 2022), e-learning (Ramdani et al., 2022), Augmented Reality (Asrori, 2022), and Lectora Inspire (Najib et al., 2024). These digital media have been shown to increase motivation and understanding of movement concepts, but their implementation is highly dependent on the availability of technological devices and adequate electricity access.

In addition to technology-based approaches, several studies have developed learning methods and models, such as the demonstration method (Asriana, 2022; Stiyapranomo, 2023), the drill method (W. A. Fajri et al., 2020), the three-post game model (Sinuraya, 2020), the cartwheel game model (Firmansyah et al., 2025), and cooperative models in gymnastics learning (B, 2022; Sukamto & Nurulita, 2023). These studies demonstrate improved learning outcomes, but most still focus on pedagogical strategies without emphasizing the role of simple physical media as movement guides.

Other research examines physical factors that influence cartwheel performance, such as arm muscle strength, flexibility, balance, and coordination (Pertiwi et al., 2021; Tresnowati et al., 2021; Hawa & Zulbahri, 2024; Kurniawan & Gusti, 2024). Furthermore, psychological aspects such as motivation, interest, anxiety, and fitness level have also been reported to contribute to successful floor gymnastics learning (Hadjarati & Haryanto, 2020; Maulana et al., 2021; Hanan et al., 2023; Huslah & Hariyanto, 2020).

In terms of equipment, several studies have modified materials such as gymnastics mats (Pratiwi et al., 2022), handstand benches (Ropi, 2020), and backbend aids (Ardi et al., 2022). Recent research has also utilized instructional videos (Santoso et al., 2025),

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differentiated learning (Wibowo et al., 2024), physical fitness exercises (Rahmadani et al., 2025), and variations of backward rolls (Rusdin et al., 2021). While these innovations have shown significant progress, most still require specific facilities and do not fully meet the needs of schools with limited resources.

Based on the literature review, several research gaps can be identified. First, no research has been found specifically developing and implementing simple, non-digital media such as floor tape as a visual aid to guide the direction and movement patterns of cartwheels in elementary school students. However, motor learning literature confirms that visual cues and guided movement are highly effective in helping students understand movement orientation and body trajectory (Schmidt & Lee, 2019; Magill & Anderson, 2021).

Second, most previous research was conducted in schools with relatively adequate facilities or used technology-based media, making it less relevant to schools with limited infrastructure, such as SD Negeri 1 Mojorembun. Third, previous research generally only assessed one or two psychomotor components, while comprehensive studies that simultaneously integrate cartwheel skills, strength, flexibility, and coordination are still very limited. Fourth, no research has specifically targeted students who have never had experience learning floor gymnastics, thus the aspect of recognizing basic movements remains neglected.

Based on the aforementioned research problems and gaps, this study aims to improve the psychomotor skills of cartwheel movements in students at Mojorembun 1 Elementary School through the use of floor tape as a visual learning aid. Specifically, this study aims to: improve students' mastery of cartwheel movements through guidance on direction and trajectory using floor tape; optimize key psychomotor components, including strength, flexibility, coordination, and motor skills; and provide an alternative, affordable, safe, practical, and sustainable floor gymnastics learning model for elementary schools with limited facilities.

The novelty of this research lies in: (1) the development and application of floor tape as a guide for cartwheel movement orientation, a method previously unstudied; (2) the focus on school contexts with very limited facilities; (3) the use of comprehensive psychomotor assessments; and (4) the tangible contribution to the practice of contextually-based physical education (PJOK) learning. Therefore, this research is expected to not only enrich scientific studies on PJOK but also provide relevant practical solutions for teachers and elementary schools in various regions with similar conditions.

METHODS

The one-group pretest–posttest design, a pre-experimental design type, is used in this study's quantitative methodology. This design was selected because it can show how the application of floor tape as a visual learning aid affects the psychomotor skill of the cartwheel movement both before and after the treatment. This strategy aligns with the research model utilized in the creation of floor exercise learning materials that have been extensively developed in the past, including augmented reality-based media (Asrori, 2022), demonstration-based media (Asriana, 2022), and application-based media

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(Agustin & Kurniawan, 2021), all of which seek to enhance movement comprehension through visualization and structured learning stimuli.

All 44 SDN 1 Mojorembun pupils made up the study's population. Purposive selection was used to select the research sample because the students' age was deemed to be physically capable of doing the cartwheel action, which is classified as a dangerous movement demanding body strength, flexibility, and coordination. Ten female students and fifteen male students made up the final sample of twenty-five pupils. Students in the fifth grade were given priority because of their more developed motor skills, which enable them to perform the maneuver in a safer and more regulated manner.

A cartwheel practice test, observation, a questionnaire, and documentation are among the research tools. With an emphasis on strength-flexibility, coordination, and movement skills, the practice test was utilized to evaluate students' psychomotor skills both before and after treatment. Throughout the learning process, direct observation was used to evaluate student responses, technical mistakes, and movement execution. Before taking part in the program, students' perceptions and starting skills were assessed using a questionnaire. In the meantime, observation data were supported by documentation in the form of field notes and photographs. The utilization of these tools is consistent with standard procedures in floor exercise learning studies that prioritize thorough and impartial assessment of movement capacity (Agustin & Kurniawan, 2021);(Asrori, 2022).

There were multiple key phases to the research process. The first step involved preparation, which included creating questionnaires, observation sheets, and cartwheel practice assessment rubrics. This was followed by coordination with the sports teacher and the school, as well as the installation of the floor tape pattern as a marker for the students' cartwheel movement orientation. The pretest was the next step, in which students completed an initial cartwheel ability test, and the researcher used an initial ability questionnaire and observation to record the results. Following the collection of preliminary data, the researcher carried out the treatment phase, which involved teaching floor exercises using tape as a visual assistance. The instructor demonstrated, explained, and gave instructions for practicing the installed tape pattern step-by-step. The researcher watched how the pupils' skills developed during this procedure and noted any alterations that were made. Using the same assessment methodology as the pretest, students took a posttest once the treatment was finished to gauge how much their cartwheel skills had improved. Data processing, statistical analysis, result interpretation, and research report preparation comprised the last phase of the study.

Descriptive statistics were used for data analysis to determine the distribution, average value, and percentage of students' ability scores. The researcher employed gain score computation based on pretest and posttest results to observe the quantitative change in learning outcomes. Additionally, the significance of the difference between scores before and after the treatment was assessed using inferential statistical testing in the form of a paired sample t-test. The standards of media and technology-based movement learning research are met by this analysis approach, particularly in studies that assess how well learning interventions affect students' psychomotor skills(Agustin & Kurniawan, 2021);(Asrori, 2022).

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RESULTS AND DISCUSSION

Result

Table 1.
Pretest and Posttest Results

Variable	Pretest		Postest	
	Value	Description	Value	Description
Aisyah	14	Good	18	Very Good
Nisa	5	Poor	7	Poor
Aini	9	Fair	11	Fair
Fitri	5	Poor	7	Poor
Uus	8	Poor	14	Good
Nafi	5	Poor	6	Poor
Rizal	8	Poor	14	Good
Fathan	13	Good	18	Very Good
Aziz	12	Fair	17	Very Good
Arya	19	Very Good	20	Very Good
Cinta	5	Poor	13	Good
Serli	5	Poor	12	Fair
Ayu	5	Poor	5	Poor
Alifa	5	Poor	5	Poor
Robi	6	Poor	17	Very Good
Azril	7	Poor	11	Fair
Rendi	8	Poor	11	Fair
Kiki	12	Fair	20	Very Good
Alvian	7	Poor	15	Good
Rizky	12	Fair	20	Very Good
Lia	5	Poor	7	Poor
Sasa	5	Poor	6	Poor
Siva	5	Poor	10	Fair
Hafid	13	Good	16	Good
Reza	20	Very Good	20	Very Good

The pretest scores indicate the students' ability before receiving the treatment, and the posttest scores indicate their ability after receiving the series of lessons using the innovative tape media. The results are presented in the table above.

The table shows that many students' pretest scores were in the "Below Fair" category. Subsequently, the posttest scores indicate that students who were previously mostly in the "Fair" and "Poor" categories showed a significant improvement.

Table 1.
Wilcoxon Test of Normality

Test Statistics	
Posttest - Pretest	
Z	-4,115[b]
Asymp. Sig. (2-tailed)	0,000

In the first data normality test, the Shapiro-Wilk test was conducted, which initially indicated that the pretest data were not normally distributed. The researcher then proceeded with a subsequent test, namely the Wilcoxon test. The results of both tests ultimately showed that the data were normally distributed.

The criterion for data to be considered normally distributed is that the significance (sig) value must be less than 0.05 (sig < 0.05). If the sig value is greater than 0.05 (sig >

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0.05), then the data is not normally distributed. In this study, the Wilcoxon test showed a sig value of 0.00, or sig < 0.05. This means the data is normally distributed and ready for the next test, which is the paired t-test.

Table 3.
Test of Homogeneity

Levene Statistic	df1	df2	Sig.
0,941	4	15	0,467

Next is the homogeneity of variance test. Since the data involves only one group/variable, the data is, of course, considered homogeneous. Data is said to be homogeneous when the significance (sig) value is greater than 0.05, and not homogeneous when the sig value is less than 0.05.

In this research data, the sig value is 0.467, which means it is greater than 0.05. Therefore, the data is said to be homogeneous.

Table 4.
Paired Sample t Test

	Paired Differences					t	df	Sig. (2-tailed)
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
PRETEST - POSTEST	-4,08000	3,06757	0,61351	-5,34623	-2,81377	-6,650	24	0,000

After conducting the normality test, the next test performed was the paired t-test. This test determines whether the tape media has an influence on students' cartwheel ability. The hypothesis test is as follows: if the significance (sig) value is greater than 0.05, then the media is said to have no influence; if the sig value is less than 0.05, then the media is said to have a significant influence on students' ability.

In the data above, it is shown that the sig. (2-tailed) The figure is 0.00. This means that the sig value is less than 0.05, indicating a significant result. Thus, the tape media indeed influences the cartwheel movement in elementary school students.

Discussion

The purpose of this study was to find out how well primary school kids' psychomotor skills may be enhanced by using basic floor tape as a visual aid when doing the cartwheel. The research hypothesis is clearly supported by the pretest-posttest comparison results, which are backed up by statistical analysis.

The main conclusion of this study is that students' cartwheel performance significantly improved following the intervention. There was a noticeable increase in scores from the pretest to the posttest, as Table 1 illustrates. Many students started in the "Poor" or "Fair" categories, but after using the tape guides for training, a sizable portion moved up to the "Good" and "Very Good" categories. The paired sample t-test results (Table 4), which produced a significance value of 0.000 ($p < 0.05$), statistically

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support this visual progression. This statistically significant difference clearly shows that the students' psychomotor learning of the cartwheel was positively and quantifiably impacted by the floor tape media.

A number of theoretical frameworks related to motor learning and the literature evaluation of the study can be used to explain the effectiveness of this straightforward intervention. First, the tape lines served as a type of *guided movement* and an external focus of attention. The tape lessened the cognitive load on pupils with relation to spatial orientation and movement trajectory by creating a distinct, physical track on the floor. Students might concentrate on performing the exercise along the visual cue rather than speculating about the proper hand-foot location and rotation path. This is consistent with research on visual learning aids (H. et al., 2022; Agustin & Kurniawan, 2021), which highlights the importance of clear visual cues for improving movement comprehension and skill development. (Aliriad, 2023) stating that a high level of motor educability—the ability to learn movement skills is necessary for mastering floor gymnastics. Floor tape media serves as a scaffold for this motor educability by providing a clear, external framework for movement learning, which aids the cognitive process of skill acquisition (Aliriad, 2023).

Second, developing complicated motor skills like the cartwheel requires a safe and structured development, which the media provided (A. Fajri, 2020; Rusdin et al., 2021). The tape ensured that repetitions were carried out with proper alignment by serving as a constant point of reference for both the teacher's demonstration and the students' practice. This probably helped develop the cartwheel's fundamental elements—strength, flexibility, coordination, and balance—in a more focused and error-free way (Pertiwi et al., 2021);(Hawa & Zulbahri, 2024). (Priadana & Suwandi, 2023) found that elementary school students in Sugihwaras District mainly have beginner and developing cardiovascular fitness. This underscores the regional need for effective, engaging physical activities that can improve overall fitness. Structured, repetitive practice facilitated by the floor tape not only teaches a specific skill but also contributes to the development of muscular strength, endurance, and coordination, all of which are essential to overall physical fitness (Priadana & Suwandi, 2023).

When compared to the body of prior research discussed in the introduction, this study's uniqueness and practical contribution stand out. Prior research has mostly focused on game-based models, specialized equipment, or digital multimedia. Despite their effectiveness, these solutions frequently require infrastructure, technology, or resources that underfunded schools like SDN 1 Mojorembun lack. This study shows that a very straightforward, inexpensive, and non-digital intervention can provide noteworthy learning results. Without relying on sophisticated technology, it directly tackles the fundamental problem of movement orientation. This discovery offers a pedagogical tool that is immediately usable, scalable, and sustainable, which is crucial for educational practice in contexts with limited resources. While online physical education was considered successful during the COVID-19 pandemic (Da'i & Aliriad, 2021) discovered that it posed intrinsic difficulties for providing practical psychomotor skill training. Our study fills this gap by providing an efficient in-person teaching technique that can assist

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overcome possible skill deficits developed during periods of remote learning, using a straightforward tactile and visual tool (Da'i & Aliriad, 2021).

The limitations of the study must also be taken into account. Although suitable for a preliminary investigation, the use of a one-group pretest-posttest approach restricts the ability to ascribe the improvement only to the tape medium since other factors, such as general maturation or practice effect, cannot be completely ruled out. Additionally, the results may not be as broadly applicable because the sample was purposefully chosen from a particular institution and was quite small. Longer-term follow-up evaluations to gauge skill retention, a larger and more varied sample, and a quasi-experimental design with a control group would all be beneficial for future studies.

The discussion concludes by confirming that the use of floor tape media is a creative, practical, and successful method for improving primary school pupils' cartwheel psychomotor abilities. It supports the idea that sophisticated technology is not always necessary for effective teaching aids, but rather clever design that tackles particular learning challenges. By offering an evidence-based, low-resource alternative for teaching basic motor skills, this study effectively fills a gap in the literature and makes a substantial contribution to the field of adaptive physical education pedagogy.

CONCLUSION

1. At SD Negeri 1 Mojorembun, fifth-grade students' psychomotor skills for the cartwheel movement are greatly enhanced by the use of floor tape media as a visual aid. The statistically significant improvement in scores from the pretest to the posttest ($p = 0.000 < 0.05$) serves as proof of this.
2. The fundamental problem of spatial orientation and movement trajectory in learning the cartwheel is successfully addressed by the straightforward, non-digital invention of using adhesive tape lines. It lessens cognitive burden, acts as an efficient external focus of attention, and offers a safe, organized progression for skill development.
3. For basic motor skill education in elementary schools with limited facilities and resources, this study offers a workable, affordable, and long-lasting pedagogical paradigm. It shows how innovative and needs-based design can transform basic resources into powerful learning materials.

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