Physical Activity Journal (PAJU)
Volume 8, Number 2, October 2026
e-ISSN : 2686-5807 | p-ISSN : 2686-5793

Development of Nearpod-Based Learning Media to improve basketball skills of Junior High School Students

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: https://doi.org/10.20884/1.paju.2026.8.2.22494

Abstract

This study aims to (1) develop Nearpod-based interactive learning media on basketball dribbling skills material for grade VII junior high school students, and (2) determine the level of validity and effectiveness of the media on improving students' dribbling skills. The method used is Research and Development (R&D) with the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model. The research population was 183 grade VII students of SMP Negeri 1 Langsa, with a sample of 126 students determined using the Slovin formula, divided into small-scale trials (50 students) and large-scale trials (76 students). The product was validated by one media expert, one basketball material expert, and one PE teacher. Validity data was analyzed in a descriptive percentage manner, while effectiveness was analyzed using the Normalized Gain (N-Gain) test based on the results of dribbling skills tests in the preparation, implementation, and advanced phases. The results showed that the Nearpod-based learning media was in the very feasible category, with an average validation score of 92% (media expert 92%, basketball material expert 94%, PE teacher 90%). Student responses reached 82.8% in the small-scale trial and 89% in the large-scale trial. The media improved dribbling skills with an average N-Gain of 0.59 (quite effective): mean scores rose from 38.4 to 74.6, and the average error rate fell from 61.6% to 25.4% (N-Gain 0.61 in the preparation phase, 0.54 in the implementation phase, and 0.63 in the advanced phase). This study concludes that Nearpod-based interactive learning media is feasible and quite effective to be used as an alternative to PE learning media for basketball dribbling material at the junior high school level

Keywords: *Nearpod, learning media, dribbling, basketball, Physical education*

INTRODUCTION

21st century education demands a learning process that is no longer teacher-centered, but is oriented towards strengthening students' critical thinking, creativity, collaboration, communication, and digital literacy, in line with the direction of the Independent Curriculum that encourages innovative and technology-based learning (Phonchan, Tanphanich, & Vongsrangsap, 2024). Physical Education (PE) as a subject

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that combines cognitive, affective, and psychomotor aspects is no exception to these demands, so the movement learning process needs to be built cognitively before being practiced motorically (Karo Karo, Sari, & Hendrawan, 2025);(Wicaksono-ikhsan & Suherman-wawan, 2023).

In practice, PE learning basketball material at the junior high school level still relies heavily on a direct teacher-centered teaching method with short demonstrations without visual media support that can be observed in detail and repeatedly by students (Arifin, 2023). This condition also causes students' basic dribbling skills to not develop optimally. Initial observations in grade VII students showed a high error rate, namely 57.1% in the preparation phase, 77.8% in the implementation phase, and 50.0% in the advanced phase, with the dominant errors in the form of a gaze that is still focused on the ball, the use of palms instead of fingers when bouncing the ball, ball bounce that is too high, the knees are not bent, the hand-foot coordination is not synchronized,and lack of confidence that makes the tempo of the movement slow.

This pattern of error is in line with the stages of movement learning proposed (Taylor & B.lvry, 2015), namely the high frequency of errors in the implementation phase can indicate that some students are still at the verbal-cognitive stage in learning motor skills, which is the stage when students still need high attention and cognitive processing to understand the purpose, sequence, and way of doing movements. As skill mastery increases, the learning process moves towards the associative stage and then the autonomous stage, characterized by fewer errors, increased consistency, and more automatic execution of movement. (Bruzi, Benda, Palhares, Fialho, & Ugrinowitsch, 2019) assert that at this stage learners rely heavily on clear and repetitive visual models to form correct motion images. This is reinforced by observational learning studies in basketball which show that video modeling has a positive effect on the acquisition of beginner dribbling skills (Panganiban & Miguel, 2023). Although the live model still shows a stronger effect than the video model alone (Zali & Mohammadzade, 2024).

A number of research on the development of basketball learning media in Indonesia, such as the development of video tutorials on basic dribbling and shooting techniques (Jaya, Kanca, Parwata, & Agung, 2023);(Setiawan, 2023), shows that video-based visual media has proven to be feasible and able to improve understanding of basic techniques compared to conventional learning. However, these media are generally one-

https://doi.org/10.20884/1.paju.2026.8.2.22494
e-ISSN : 2686-5807 | p-ISSN : 2686-5793

way and do not accommodate interactivity or formative assessments that can measure student understanding before practice. This gap is what drives the need for digital learning media that combines motion visualization with interactive elements and formative assessments in one platform.

Nearpod is a slide-based interactive learning platform that combines multimedia content with real-time formative assessment features such as Video/Slow Motion, Draw It, Quiz, Time to Climb, and Poll (Fajar, Woro, Handayani, & Yudha, 2022). The application of Nearpod in various subjects in Indonesia has been proven to increase student motivation and learning outcomes (Bintoro, Triwahyuni, & Emyus, 2024). For example, the application of Nearpod to biology learning (Lita, Mellawaty, & Tamurih, 2024), the application to Indonesian language learning (Oktaviani & Nurhamidah, 2023) and biology learning (Sagara, Sugiarti, Saputri, & Kusumayati, 2023). In the realm of PJOK,) (Surimeirian, Roberto, & Fajar, 2025) has developed Nearpod learning media with a deep learning method in pencak silat courses, but the application of Nearpod to learning big ball game skills such as basketball dribbling at the junior high school level is still very limited to be studied.

The selection of Nearpod in this study was based on the alignment of its features with a number of theoretical frameworks. Cognitive Theory of Multimedia Learning (Ramadhani, Sukri, & Nurindah, 2025). Meanwhile , (Mayer, 2024) explains that a well-designed combination of visual and verbal encourages active processing without overloading cognitive capacity. Motor Learning Theory (Moritz, Woll, & Wagner, 2022) emphasizes the importance of visual models and feedback in shaping motion schemas.

The perspective of contemporary constructivism places learners as active builders of knowledge through exploration, interaction, and scaffolding, so that Nearpod can be utilized as a medium that provides gradual support in building students' understanding (Dewi & Elisa, 2025). The Technological Pedagogical Content Knowledge (TPACK) framework emphasizes the importance of alignment between technological knowledge, pedagogy, and content in the integration of learning technology, so the use of Nearpod needs to be adjusted to the characteristics of the material and the pedagogical strategies applied (Irwanto, 2021). Cognitive Load Theory in the study of digital learning emphasizes the importance of managing extraneous cognitive load through the design of appropriate information presentation; therefore, the material in Nearpod can be arranged gradually and

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e-ISSN : 2686-5807 | p-ISSN : 2686-5793

structured so that students' cognitive resources are more directed to the learning process (Skulmowski & Xu, 2022).

Meanwhile, the perspective of self-efficacy shows that belief in one's own abilities can develop through mastery experiences and vicarious experiences. In this context, demonstration videos can provide a vicarious experience through observation of the model, while quizzes or interactive activities that allow students to successfully complete tasks gradually can provide initial mastery experiences (Gebauer, Mcelvany, Köller, & Schöber, 2021).

Based on this description, there is a research gap in the form of: (1) the application of Nearpod in Indonesia is still concentrated on cognitive subjects and has not touched much in the psychomotor realm of PE, especially basketball dribbling; and (2) the development of existing basketball learning media is still in the form of one-way tutorial videos without interactive elements and formative assessments.

The novelty of this research lies in the development of Nearpod media which is specifically designed based on the mapping of student errors in each phase of dribbling motion (preparation, implementation, advancement), with the integration of the framework of Cognitive Theory of Multimedia Learning, Motor Learning Theory, Constructivism, TPACK, Cognitive Load Theory, and Self-Efficacy at the same time in one PJOK learning design.

Based on this description, this study aims to: (1) determine the feasibility level of Nearpod-based learning media on basketball dribbling materials based on the assessment of media experts, material experts, and PE teachers; and (2) to find out the effectiveness of the Nearpod-based learning media on improving the dribbling skills of basketball students in grade VII of SMP Negeri 1 Langsa.

METHOD

This research uses the Research and Development (R&D) approach, which is a research method used to produce certain products and test the effectiveness of these products (Rahayu, 2025). The product produced is in the form of Nearpod-based interactive learning media on basketball dribbling skills material for grade VII junior high school students. The development model used is ADDIE, which five stages: Analysis, Design, Development, Implementation, and Evaluation (Irwanto & Saputra, 2026).

https://doi.org/10.20884/1.paju.2026.8.2.22494
e-ISSN : 2686-5807 | p-ISSN : 2686-5793

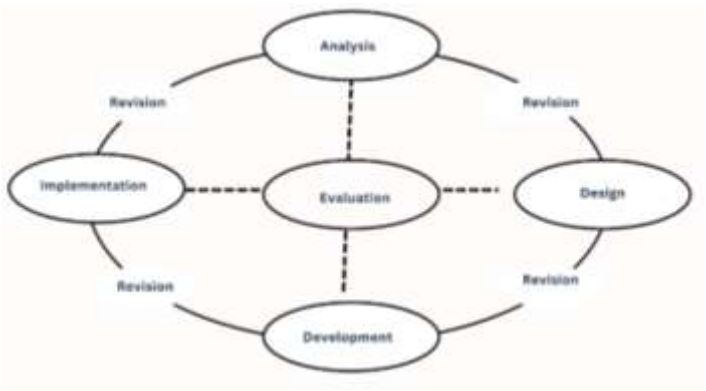


Figure 1. ADDIE development stages

The following are the stages of ADDIE model media development, which are as follows:

1. Analysis.

This stage aims to identify learning needs and problems through initial observation and distribution of needs analysis questionnaires to PE teachers and grade VII students of SMP Negeri 1 Langsa, analyze basketball dribbling skills materials along with assessment indicators in the preparation, implementation, and advanced phases, and analyze the learning objectives to be achieved through media development.

2. Design.

This stage develops the Nearpod content framework based on the results of needs analysis, including the preparation of learning slide storyboards, the design of demonstration videos and slow motion dribbling techniques, the preparation of Quiz and Time to Climb questions, and the design of Draw It activities to identify the position of the body and the trajectory of the ball in each phase of movement.

3. Development.

This stage realizes the design into a Nearpod media product that is ready to be tested, including the creation and upload of demonstration videos, the preparation of interactive slides along with formative assessment features, the preparation of dribbling skills test instruments, product validation by one media expert, one basketball material expert, and one PE teacher, as well as product revision based on validator input.

4. Implementation.

This stage applies validated products to real users through small-scale trials on 50 students and large-scale trials on 76 grade VII students of SMP Negeri 1 Langsa, with

https://doi.org/10.20884/1.paju.2026.8.2.22494
e-ISSN : 2686-5807 | p-ISSN : 2686-5793

data collection through student response questionnaires and dribbling skills pretest-posttests.

5. Evaluation.

This stage is carried out formatively at each stage for product improvement, including validity data analysis using percentage descriptive techniques and media effectiveness analysis on dribbling skills using the Normalized Gain (N-Gain) test.

The research population is all grade VII students of SMP Negeri 1 Langsa which totals 183 students. The sample was determined using the Slovin formula (Santoso, 2023) with a margin of error of 5%, namely:

$$n = \frac{N}{1 + Ne^2}$$

Description:

n= number of samples
N= total population
e= margin of error

The sample of 126 students was involved in small-scale trials (50 students) and large-scale trials (76 students). The research instruments consist of: (1) a needs analysis sheet; (2) validation sheets of media experts and basketball subject matter experts as well as PJOK teacher assessment questionnaires that assess aspects of material suitability, visual quality and interactivity of Nearpod features, as well as suitability with student characteristics; (3) student response questionnaire to small-scale and large-scale trials that include aspects of material interconnectedness, language use, display, implementation, and benefits; and (4) dribbling skills test instruments in the form of observation sheets with assessment indicators in the preparation, implementation, and follow-up phases used in the pretest and posttest.

The validity and practicality data of the media were analyzed using a percentage descriptive technique with the formula P = (x / Xi) × 100%, with P being the percentage of evaluation results, x being the total respondent answer score, and Xi being the maximum score number. The interpretation criteria for the percentage of eligibility are presented in Table 1.

https://doi.org/10.20884/1.paju.2026.8.2.22494
e-ISSN : 2686-5807 | p-ISSN : 2686-5793

Table 1. Media Eligibility Percentage Criteria

Percentage	Remarks	Meaning
80% - 100%	Highly Worth It	In use
60% - 79%	Worthy	In use
50% - 59%	Quite Decent	Replaced
< 50%	Not Eligible	Replaced

Source : (Yuliawan, 2013)

The effectiveness of media on learning outcomes was analyzed using the Normalized Gain (N-Gain) test, which is the difference between posttest and pretest scores, with the formula N-Gain = (Spost - Spre) / (Smax - Spre), with Spost being the posttest score, Spre being the pretest score, and Smax being the maximum score. The interpretation criteria for the level of effectiveness of N-Gain are presented in Table 2.

Table 2. N-Gain Interpretation

Percentage (%)	Remarks
< 40	Ineffective
40 – 55	Less effective
56 – 75	Quite effective
> 76	Effective

Source: (Rusdarti, Farliana, & Oktarina, 2025)

RESULT

Here are the results of the research based on validators and feedback from students:

a. Needs Analysis / Initial Data.

The results of the needs analysis show that basketball dribbling learning is still centered on teachers with limited visual media. The initial data (pretest) shows the level of student error in each phase of dribbling movement as presented in Table 3

Table 3. Percentage of Student Errors Before Media Use (Preliminary Data)

Motion Phase	Number of Students Experiencing Errors	Percentage
Preparation	72 students	57,1%
Implementation	98 students	77,8%
Advanced	63 students	50,0%

Based on the hypothetical data, the implementation phase had the highest error percentage (77.8%), indicating that grade VII students still had difficulty coordinating

https://doi.org/10.20884/1.paju.2026.8.2.22494
e-ISSN : 2686-5807 | p-ISSN : 2686-5793

dribble techniques correctly, especially keeping their eyes forward, using their fingers when bouncing the ball, and maintaining a balanced body position. Meanwhile, the preparation (57.1%) and advanced (50.0%) phases showed a lower error rate because the movements in both phases were relatively simpler than the implementation phase

The following are the media that are commonly used in the learning process of Physical Education in basketball materials:



Figure 2. Physical Education Learning Media Before Using Nearpod

Based on the image 2 of the media used only using the student handbook, the images displayed are only the images in the student handbook, then learning media is developed on Nearpod-based basketball materials. The features developed include a collaborative board, an explanation video of basketball game techniques and ends with Time To Climb. Here is the display of the developed media:

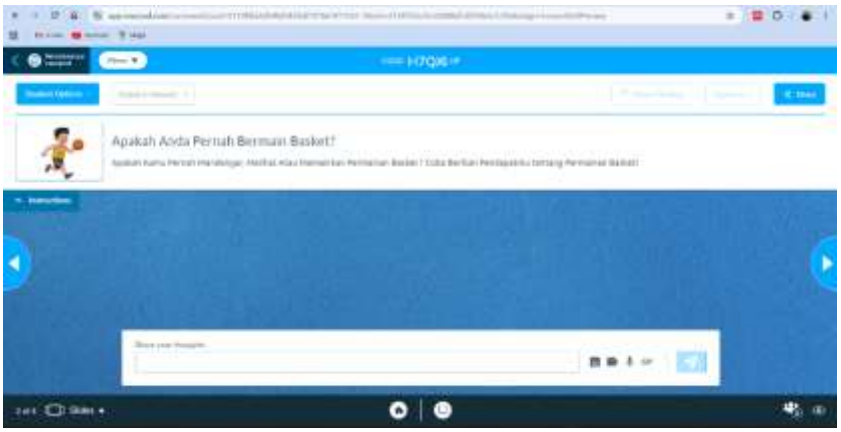


Figure 3. Papan Collaborative

Collaborative boards are interactive student features, students can bring each other up opinions about what they know about the game of basketball and opinions

https://doi.org/10.20884/1.paju.2026.8.2.22494
e-ISSN : 2686-5807 | p-ISSN : 2686-5793

expressed by students will be able to respond and be seen by other peers.



Figure 4 is a video that explains how to play basketball, then the last feature is Time To Climb which is an interesting quiz feature that can be accessed by choosing the player character and the student with the highest points will appear at the end after all students finish answering the questions. Basketball game materials can be accessed via cellphones, Smart Phones, Tablets, and Computers, without having to download the application. Students only need to enter the class code or link that the teacher has shared.

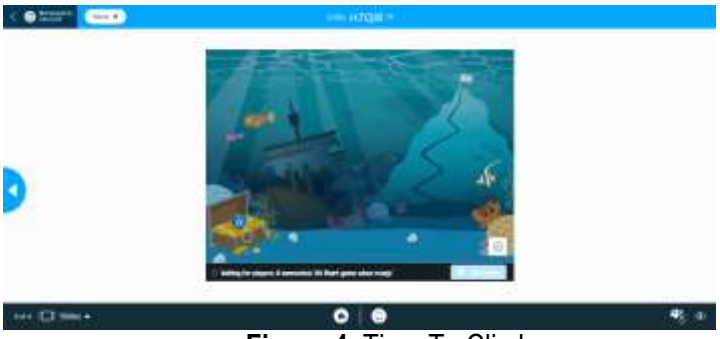


Figure 4. Time To Climb

b. Results of Expert Validation.

Nearpod's learning media products are validated by one media expert, one basketball material expert, and one PJOK teacher. The validation results are presented in Table 4.

Table 4. Validation Results of PJOK Experts and Teachers

Validator	Score	Category
Media Member	92%	Highly Worth It
Basketball Subject Matter Expert	94%	Highly Worth It
PJOK Teacher	90%	Highly Worth It
Average	92%	Highly Worth It

Based on the validator's input, revisions were made including adding text captions to slow motion videos, adjusting the difficulty level of Quiz and Time to Climb questions to

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e-ISSN : 2686-5807 | p-ISSN : 2686-5793

the characteristics of grade VII students, and improving instructions on the Draw It feature to make it easier for students to understand.

c. Product Test Results.

The small-scale trial involved 50 students and the large-scale trial involved 76 grade VII students of SMP Negeri 1 Langsa. The student response questionnaire measures five aspects: material interconnectedness, language use, appearance, implementation, and benefit. The results of both trials are presented in Table 5 and Table 6.

Table 5. Results of small-scale trials

Aspects	Percentage
Material relevance	82%
Language use	83%
Display	80%
Implementation	84%
Benefits	85%

Table 6. Large-Scale Trial Results

Aspects	Percentage
Material relevance	89%
Language use	88%
Display	87%
Implementation	90%
Benefits	91%

The results showed an increase in the percentage of responses on all aspects from small-scale trials (average 82.8%) to large-scale trials (average 89%), both of which were in the very feasible category.

d. N-Gain Test Results.

The effectiveness of media on dribbling skills was measured through pretest and posttest on 126 students for each movement phase. The results of the N-Gain analysis are presented in Table 7.

Table 7. Pretest, Posttest, and N-Gain Results per Motion Phase

Motion Phase	Score Average Pretest	Score Average Posttest	N-Gain	Category
Preparation	42,9	77,8	0,61	Quite Effective
Implementation	22,2	64,3	0,54	Less Effective
Advanced	50,0	81,7	0,63	Quite Effective
Average	38,4	74,6	0,59	Quite Effective

Pretest and posttest scores are the percentage of students who show correct movements in each phase (100% minus the percentage of errors in Table 3 as a

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baseline). The results showed an improvement in all phases, with the implementation phase showing a relatively lower improvement compared to the preparation and advanced phases, in line with the level of complexity of the movement coordination in those phases.

DISCUSSION

The results of the study showed that Nearpod-based learning media on basketball dribbling material met the criteria of being very feasible based on the assessment of media experts (92%), basketball material experts (94%), and PJOK teachers (90%), with an average of 92%. These findings answer the formulation of the first problem and are in line with various studies on the development of sports learning media that show that digital and interactive multimedia media can obtain a high level of feasibility after going through expert validation. The use of Nearpod has also shown positive results in various learning contexts in Indonesia, both in increasing student engagement and learning motivation (Pramesti & Camellia, 2024).

Regarding effectiveness, the results of the N-Gain test with an average of 0.59 in the category of quite effective showed that the use of Nearpod media was able to reduce the percentage of students' dribbling errors in all phases of movement, thus answering the formulation of the second problem of the study. The lower increase in the implementation phase (N-Gain 0.54) compared to the preparation (0.61) and advanced (0.63) phases suggests that mastering the movement phase involving more complex coordination still requires a more intensive learning and practice process. These findings are in line with recent studies on motor learning which show that motor skills learning is influenced by exercise, cognitive processing, practice regulation, attention focus, and the provision of augmented feedback. Recent systematic studies have also shown that augmented feedback, including video feedback, is one of the most widely used strategies in learning motor skills, although its effectiveness can depend on the characteristics of the task and learning conditions (Barzyk & Gruber, 2024); (Petancevski, Job Fransen, & Impellizzeri, 2022).

The increase in student response from small-scale trials (average 82.8%) to large-scale (average 89%) indicates that the revision process based on validator and

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early user input has helped improve the product (Yukans, Utari, Azka, Audina, & Rahmah, 2025). This is in line with the principle of formative evaluation in the development of learning media, namely the use of information from the trial process to identify shortcomings and improve the product before it is used more widely (Sasongko, Djono, Sholihah, Putri, & Muiz, 2025). The slow motion video and Draw It features on Nearpod can also be understood through the Cognitive Theory of Multimedia Learning (CTML), which explains that multimedia learning involves visual and verbal processing channels with limited capacity and requires active processing in the form of selection, organization, and integration of information (Mutlu-bayraktar, 2024). Thus, the presentation of motion demonstrations through videos and structured interactive activities has the potential to help students focus on relevant information without adding unnecessary processing.

Meanwhile, the Quiz and Time to Climb features that provide students with the opportunity to complete tasks gradually can be associated with the formation of self-efficacy through mastery experience. Demonstration videos can also provide a vicarious experience through observation of movement models. Recent research shows that mastery experience and vicarious experience are important sources that can predict students' self-efficacy. Thus, Nearpod activities that allow students to observe models and obtain success on initial tasks gradually have the potential to support the development of confidence before students undertake more complex movement practices (Hidayatullah, Csíkos, & Setiyawan, 2024).

The findings regarding improved response and motivation are also consistent with Nearpod's more recent research. A 2024 study showed that the use of Nearpod as an interactive learning medium can increase student motivation and engagement, while other studies on Nearpod-assisted learning showed a positive association between Nearpod use, motivation, and problem-solving skills (Risnawati, Maulidina, & Fransisca, 2024).

However, this study has limitations. The implementation phase still shows a relatively lower level of effectiveness, so Nearpod media needs to be combined with a portion of field practice and adequate direct feedback from teachers, rather than being used as the only learning resource. The findings are in line with the motor learning literature that shows that media or augmented feedback does not replace the need for

https://doi.org/10.20884/1.paju.2026.8.2.22494
e-ISSN : 2686-5807 | p-ISSN : 2686-5793

hands-on exercise and movement experience (Jiménez-díaz, Chaves-castro, & Maria, 2021). Therefore, Nearpod is more appropriately placed as a supporting medium to prepare for cognitive comprehension, provide visual models, and help students recognize mistakes before or during the practice process.

The research subjects that are still limited to one school also cause the generalization of results to be done carefully. The practical implication of these findings is that PJOK teachers can utilize Nearpod as a medium to enhance cognitive understanding before movement practice, especially in dribbling phases that require complex coordination. The combination of visual demonstrations, interactive activities, repetitive practices, and direct teacher feedback makes it a more appropriate approach than using Nearpod instead of hands-on learning.

CONCLUSION

Nearpod-based interactive learning media on basketball dribbling material for grade VII students of SMP Negeri 1 Langsa has been successfully developed through the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model. The media developed obtained a very high level of feasibility based on the validation of media experts, basketball material experts, and PJOK teachers with an average of 92% (very feasible category), and proven to reduce the percentage of students' dribbling errors in all phases of movement with an average N-Gain of 0.59 (the category of quite effective). Small-scale and large-scale trials showed a positive and increased response from students to the developed media.

This research has limitations in the scope of subjects that are limited to one school and the level of effectiveness in the implementation phase which still needs to be improved through combination with field practice. The implications of this study confirm that Nearpod-based learning media can be used as an innovative alternative in PJOK learning, especially basketball dribbling material, and opens up opportunities for further development in other basic techniques of big ball games at the junior high school level.

https://doi.org/10.20884/1.paju.2026.8.2.22494
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