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Development of Android-Based Rhythmic Learning Media (SENDI): Digital Gymnastics for Students

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Abstract

The purpose of this research is to determine the effectiveness of android-based mobile learning (SENDI-Digital Gymnastics) in improving the competence of PJKR student graduates, especially in the rhythmic activity course for the 2024/2025 school year. This research uses research from Borg and Gall through 10 stages including: (1) Preliminary Study, (2) Research Planning, (3) Initial Product Development, (4) Initial (Limited) Field Trial, (5) Limited Field Test Revision, (6) Broader Field Test, (7) Revision of Field Test Results, (8) Feasibility Test, (9) Revision of Feasibility Test Results, (10) Dissemination and Socialization of Final Product. The results of this study show that the product developed is included in the category of suitable for use based on the results of expert assessment. The results of the product trial on the subjects also showed that the ability of rhythmic gymnastics experienced a significant improvement before and after the treatment using the product. The hypothesis test obtained the results that there was a significant difference in the competence of graduating rhythmic gymnastics students before and after using SENDI media. Students experience an increase in the competence of graduating rhythmic gymnastics after learning using SENDI media.

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Introduction

According to the Law of the Republic of Indonesia Number 20 of 2003, it is explained a process in which students and educators are involved with each other Other and with learning materials in a learning environment to achieve their goals. Hamalik (2015) said that to achieve the goal, students and teachers work together using a variety of resources, including books, whiteboards, chalk, and other props, as well as physical spaces such as classrooms and audiovisual equipment to organize teaching and learning activities.

The development of science and technology has further encouraged reform efforts in the use of technological results in the learning process. Teachers are required to be able to keep up with technological developments with the ability to use technological tools to support the learning process (Nurseto, 2018). Teachers can at least use cheap and efficient tools that, although simple and unpretentious, are a must in order to achieve the expected teaching goals. In addition to being able to use the available tools, teachers are also required to be able to develop the skills of making learning media that they will use if the media is not available. Teachers must have sufficient knowledge and understanding of learning media (Arsyad, 2019).

Good education is supported by various aspects that support the learning process. Among them are teachers, students and learning facilities such as books or learning media. Learning is a teacher's effort that aims to educate his students (leading to student interaction with other learning resources) with the idea that goals will be achieved (Trianto, 2017). Learning can be effective, one of which is determined by the existence of learning media that can help teachers in delivering material (Slameto, 2015; Tekin, 2025).

Learning is not only conveying information or knowledge, but conditioning learners to learn, because the main purpose of learning is the learner himself (Abdullah et al., 2020; Ciddi, 2025). Learning is the process of interaction between educators and students as well as learning resources and media used, in an effort to change cognitive, affective and motor aspects. Therefore, in order for learning activities to be meaningful for students, educators need to develop learning media that are varied and interesting for students. Learning media is any form of communication tool that can be used to convey information from sources to students in a planned manner so as to create a conducive learning environment where the recipients can carry out the learning process efficiently and effectively.

Learning media is a tool used to convey the content of learning materials that can stimulate students to follow the learning process (Sanjaya, 2016). According to Yaumi (2018) Learning media are all forms of physical equipment that are designed in a planned manner to convey information and build interactions. Learning media is a message carrier technology that can be used for learning purposes, learning media is a physical means to convey subject matter. Learning media is a means of communication in print and sight and hearing, including hardware technology (Hamalik, 2015).

Media is a means that can be used as a useful intermediary to increase effectiveness and efficiency in achieving goals. Learning media includes what teachers use to engage all five senses of sight, hearing, touch, smell and taste

when delivering their lessons (Nurya et al., 2023). Lesson media is a carrier of information that is specifically designed to meet the objectives in teaching and learning situations (Slameto, 2021).

The world of education in the use of information and communication technology continues to develop in various strategies and patterns that can be developed by educators (Maritsa et al., 2021). Technology for learning media can basically be grouped into a system *E-learning* as a form of learning that utilizes electronic devices and digital media, as well as *Mobile Learning* (*m-learning*) as a form of learning that specifically utilizes mobile communication devices and technologies (Septiana, 2023). The very high penetration rate of mobile devices, the relatively easy use rate, and the increasingly affordable price of devices, compared to personal computer devices, are the driving factors that further expand the opportunities for use or application *Mobile Learning* as a new trend in learning, which forms a paradigm that can improve the efficiency and effectiveness of the learning process and outcomes of students in Indonesia in the future (Rokhman & Ahmadi, 2020).

Digital media is one of the media that can be used for learning activities. Digital media is a component in the form of computers, internet, gadgets, and other digital devices. Digital media is a medium that can be created, viewed, transmitted, or modified, and used by digital electronic devices. Digital media is a combination of various media (file formats) in the form of text, images (vectors or bitmaps), graphics, sound, animations, videos, interactions and others that have been packaged into digital (computerized) files, used to convey or deliver messages to the public. Digital media is a combination of data or media to convey information so that the information is presented more interestingly.

Digital media-based learning is one of the indications of quality education. Quality schools need to achieve goals based on policies. The use of digital media as a support for learning activities can be used as an alternative for teachers in presenting learning materials to make them more interesting. The use of digital media in the learning process allows students to be able to learn more thoroughly, more deeply, with a variety of varied sources. With the facilities that have been provided by digital media, students can learn flexibly, not bound by distance, space and time restrictions. In addition, the learning materials presented are more diverse, not only in the form of text, but also more varied, including visual, audio, and motion.

Android is an operating system for Linux-based mobile devices that includes the operating system, *middleware* and applications. Android provides an open platform for developers to create apps (Nawawi et al., 2021). The android architecture consists of *Application, Application Framework, Libraries, Android Runtime* and Kernel (Hendrastuty, 2021). The advantages of this android-based m-learning are that it can present material in a practical and simple form, easy to carry around, attractive, equipped with images and colors and can be learned anywhere and anytime through an android smartphone device (Windawati & Koeswanti, 2021). Rhythmic activities are one of the aspects that exist within the scope of Physical Education, Sports, and Health subjects (Herlambang, 2017). Rhythmic activities with a wide variety of materials in them (including aerobic gymnastics and *Aerobic Gymnastics*), is a form of a series of rhythmic aerobic dance movement patterns is a material that is still rarely taught by physical education teachers, this is allegedly because some of the teachers are not competent in mastering the basic material of rhythmic gymnastics, especially other rhythmic activity materials.

Method

This research Using research from Borg and Gall through 10 stages including: (1) Preliminary Study, (2) Research Planning, (3) Initial Product Development, (4) Initial (Limited) Field Trial, (5) Limited Field Test Revision, (6) Broader Field Test, (7) Revision of Field Test Results, (8) Feasibility Test, (9) Revision of Feasibility Test Results, (10) Dissemination and Socialization of Final Product (Rohmaini et al., 2020). This research is planned at the Faculty of Sports Sciences, State University of Medan. The time for this research is carried out for one semester, namely in the month of April 2025. This study only takes data on the application of SENDI (Digital Gymnastics) based media *Andromeda* at the Physical Education, Health and Recreation Study Program, Faculty of Sports Sciences, State University of Medan. The population of this study is students of the Physical Education, Health, and Recreation Study Program who are taking rhythmic activity gymnastics courses in the second semester of the 2024/2025 school year with a population of 115 people. Small sample of 25 people, large sample of 35 people with paired design, namely before and after treatment.

Results

Digital gymnastics media or hereinafter referred to as SENDI is developed with several stages or processes ranging from preliminary studies, draft model design, expert validation, small-scale trials, large-scale trials, and final products. The results of both small-scale and large-scale trials will be analyzed with a paired sample t test to test the effectiveness of the media by looking at the average difference.

Development of Digital Gymnastics Media (SENDI)

The media is one of the intermediary tools used to facilitate the delivery of information to the public. The learning process carried out by lecturers to students requires a medium that can help students to accept and understand the material easily. The media makes it easier for lecturers to convey material, both concrete and concrete. Learning using media can improve students' comprehension skills because the material provided can be well received. Media is needed both in online learning and offline learning. One of the purposes of using learning media is to improve students' graduation ability, namely by obtaining a score above the minimum set by the lecturer.

The results of interviews with 3 lecturers in the rhythmic activity course obtained information that there are still many students who do not understand rhythmic activity gymnastics techniques properly and correctly in learning rhythmic activities. This phenomenon shows that students are not able to understand rhythmic gymnastics material. Learning media needs to be developed so that students can receive and understand the material well. After knowing the field conditions experienced by the lecturers and students above, the researcher took the initiative to conduct discussions with several lecturers, especially lecturers in the rhythmic activity course, media expert lecturers, material expert lecturers, expert lecturers in the course curriculum section. The discussion or known as FGD was carried out for 2 hours from the results of the discussion obtained several important notes in order to solve the problems of online learning and offline learning. The results of the FGD can be seen in Table 1.

Table 1. FGD Results

Yes	Notes
1	Lecturers and students need a medium that can be used for both online and offline learning
2	The media can be studied on android because it sees that all students have android
3	Media can attract the millennial generation, especially the generation that likes gadgets.
4	Media can be operated online or offline

Based on the results of *the Focus Group Discussion* (FGD) above, this study plans to develop digital gymnastics media, hereinafter referred to as SENDI in rhythmic gymnastics courses. The results of this FGD are supported by the results of previous research which also found several factors that require the development of android-based or digital-based learning media. Students have difficulty in understanding the material provided by lecturers. Students finally cannot accept the material given by the lecturer well because the media used does not attract students. In fact, many students when assessing their rhythmic gymnastics skills did not pass their competencies.

Lecturers need a learning medium that attracts students and makes it easier to deliver material to students. The learning media that must be developed is flexible and easy for students to learn. Students who like gadgets can develop learning media that can be installed on gadgets so that students can learn anytime and anywhere. SENDI media is a solution for lecturers and students to improve the ability to pass rhythmic gymnastics competencies. This is because with the SENDI media, students can learn rhythmic gymnastics materials and movements at any time. Students not only learn in the classroom but can also learn outside the classroom and outside of class hours. The objectives of the development of digital-based learning media, especially digital gymnastics (SENDI), include the following.

a. Creating learning media that is flexible and integrated with students' lives
b. Assisting lecturers in delivering material to students.
c. Help students to understand rhythmic gymnastics material.

The media developed by SENDI when it first enters will be greeted with Figure 1.

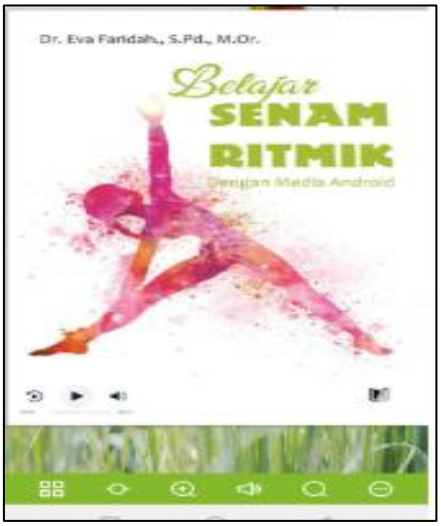

Figure 1. Media Front Page

Students who enter the SENDI media for rhythmic gymnastics can continue by pressing the learning entry menu. Students will be included in the application of rhythmic gymnastics learning media. The SENDI media developed displays theoretical material related to rhythmic gymnastics. The material included the history of rhythmic gymnastics, rhythmic acrobatics, basic movements of rhythmic gymnastics, physical conditions in rhythmic gymnastics, rhythmic gymnastics learning media, and learning media. The material is presented in text with an attractive appearance. In addition, the material presented in the SENDI application when used, the user seems to read a book of sounds because it is followed by movements like books. The display can be seen in Figure 2:

Figure 2. Display of Rhythmic Gymnastics Materials

The material presented is especially for the basic movement tutorial of rhythmic gymnastics, in the SENDI application there is also a motion video on the material page. This means that the advantage of this digital gymnastics media is not only presenting the steps of rhythmic gymnastics movements, but also presenting movement videos on the same page. This condition makes it easy for application users to understand the movements that will be followed or imitated. It is one of the differences between physical books and digital books or known as digital gymnastics. The display of the material and video pages in the page can be seen in Figure 3:

Figure 3. Page View with Motion Pictures

The products developed are then subjected to expert validation tests to obtain suggestions, inputs and product improvements . The expert validation of the SENDI rhythmic gymnastics media development product was validated by 2 lecturers who are experts in materials and 1 media expert. Expert validation will assess and provide feedback and suggestions on the SENDI media that has been developed. The material that is assessed is about the supporting theory of the media, the background of media development, the purpose of media development, and the material presented in the SENTI media. Based on the results of the validation, the following results were obtained (see Table 52:

Table 2. Ahi Validation Results

Yes	Indicator	Member 1	Member 2	Member 3	Average	Categories
1	Supporting Theories of Learning Media	4	4	4	4	Excellent
2	Background in Learning Media Development	4	4	4	4	Excellent
3	Objectives of Learning Media Development	4	3	4	3.67	Excellent
4	Content of the Material according to the goals to be achieved	3	4	4	3.67	Excellent
5	The application displays gymnastics materials in a sequence	4	4	4	4	Excellent

Based on the table of expert validation results using 5 indicators, all of them were obtained in the very good category. Based on the validation of experts, they provide several notes that can make the model better. Some expert notes can be seen in Table 3.

Table 3. Expert Advice Notes on SENDI Media Results

Yes	Members	Suggestions
1	Arjuna Gilang Ramadhan	The description of the use of the media is more detailed so that lecturers can easily use it later
2	Dimas Galih Farelino	a. The material is added not only 2 so that it is easier for students to choose the desired rhythmic gymnastics b. The login page adds an illustration of a gymnastics image so that it gives a direct overview to media users
3	Pradipta Utama Hero	The material added is too little if there are only 2

Based on the results of the expert validation above, the SENDI Media is refined in accordance with the suggestions from experts to be better than the developed model. The model that is being improved and advice from experts can be seen in Table 4. SENDI media containing rhythmic gymnastics that have been validated by experts and instruments that have been tested to determine validity and reliability are then used for small class trials. The

product is assessed in the scope of a small class as many as 2x, namely pretests and postes (after revision or repair). Based on the results of the small class trial, the results of the product assessment in the small class were obtained and given in Table 4.

Table 4. Results of the Competency Assessment of Small Class Rhythmic Graduation

Yes	Criteria	Loans		Postest	
		Frequency	(%)	Frequency	(%)
1	Good	2	8	20	80
2	Pretty good	4	16	5	20
3	Less good	16	64	0	0
4	Not good	3	12	0	0
Quantity		25	100	25	100

The results of students' ability in rhythmic activities before and after being given learning using the SENDI media of rhythmic gymnastics were obtained information that showed significant differences. At the pretest stage, students' rhythmic activity ability was mostly classified as a poor criterion, which was as much as 64%. This assessment is carried out to students before being given learning using SENDI media. However, after students in small classes were given learning using SENDI media, they showed different results. Most students have good abilities in rhythmic activities, which is as much as 80%. Students are able to perform basic rhythmic activity movements well according to the directions conveyed during learning using SENDI media.

The products tested in small classes showed an increase in the ability of rhythmic gymnastics competencies possessed by students before learning and after learning using SENDI media. The trial in a large class of products was tested on 35 samples. Students who are used as samples in large class trials are students who have not been sampled in small classes. The results of the assessment before and after the learning can be seen in Table 5.

Table 5. Results of Competency Assessment for Large Class Rhythmic Graduation

Yes	Criteria	Loans		Postest	
		Frequency	(%)	Frequency	(%)
1	Good	3	8.6	30	85.7
2	Pretty good	6	17.1	5	14.3
3	Less good	25	71.4	0	0
4	Not good	1	2.8	0	0
Quantity		35	100	35	100

The results of the trial in the large class of rhythmic gymnastics SENDI media obtained information that showed significant differences. The competency ability of students to graduate rhythmic gymnastics before and after learning is significantly different. In the pretest stage, most of the students' rhythmic activity abilities are classified as poor criteria, namely 71.4%. This assessment is carried out for students before being given learning using SENDI media. However, after students in large classes were given learning using SENDI media, they showed

different results. Most students have good skills in rhythmic gymnastics. Students are able to perform basic rhythmic activity movements well according to the directions conveyed during learning using SENDI media.

Effectiveness of SENDI Media

Based on the results of the assessment of students' rhythmic activity ability at the stages of small class and large class prettes, the statistical description was obtained (see Table 6). Based on the results of the statistical test above, information on the competency ability of students graduating rhythmic gymnastics before learning with SENDI media was obtained. The average score obtained by students in the small class was 41.50 while in the large class was 42.96. The average score is not much different, illustrating that students in small and large classes on average have the same basic competency skills for graduating rhythmic gymnastics. The lowest score achieved by students in small classes is also not much different, namely 24 for small classes and 27 for large classes. This means that students who have the lowest rhythmic activity ability are still the same and not much different. The highest score is also still the same where the small class gets a score of 62 while the large class score is 64.

Table 6. Description Statistical of Rhythmic Activity Ability in the Pretest Stage

	Pretes_kecil	prestes_besar
Red	41.50	42.96
Median	41.00	44.50
Mode	43.00	46.00
Std. Deviation	7.758	8.256
Minimum	24.00	27.00
Maximum	62.00	64.00

Students who have been given learning using SENDI media are assessed for rhythmic activity ability again. The results of this assessment of rhythmic activity ability can be described statistically as follows (see Table 7).

Table 7. Description Statistical of Posttest Stage Rhythmic Activity Ability

	posttes_kecil	postest_besar
Red	63.83	67.24
Median	63.50	67.00
Mode	63.00	70.00
Std. Deviation	3.79	3.53
Minimum	57.00	62.00
Maximum	70.00	74.00

Based on the results of the statistical test above, information on the competency ability of students graduating rhythmic gymnastics before learning with SENDI media was obtained. The average score obtained by students in the small class was 63.83 while in the large class was 67.24. The average score is not much different, illustrating that students in small and large classes on average have the same competency ability to graduate rhythmic

gymnastics after treatment. The lowest score achieved by students in small classes is also not much different, namely 57 for small classes and 62 for large classes. This means that students who have the lowest competency ability to graduate from rhythmic gymnastics are still the same and are not much different. The highest score is also still the same where the small class gets a score of 70 while the large class score is 74.

The hypothesis is to find out the difference in the average product assessment at the pre and post stages in the small and large classes, the results of the paired sample t test are obtained as shown in Table 8. Based on the results of the hypothesis test, it is known that the calculated t value in the small class is 15.49 with a p value of 0.000. The p value is lower than 0.05 (0.000 < 0.05) so that the hypothesis is accepted that there is a significant difference in the competence of graduating rhythmic gymnastics students before and after using the SENDI media. Students experience an increase in the competence of graduating rhythmic gymnastics after learning using SENDI media.

Based on the results of the hypothesis test, it is known that the t-value of the calculation in the large class is 18.48 with a p value of 0.000 (see Table 8). The p value is lower than 0.05 so that the hypothesis is accepted that there is a significant difference in the competence of graduating rhythmic gymnastics students before and after using the rhythmic gymnastics SENDI media. Students experienced an increase in the competence of rhythmic gymnastics graduation after learning to use SENDI media in large classes.

Table 8. Hypothesis Test

Yes	Groups	Average	Differences	t Count	P value
1	Small pre class	41.50	22.33	15.182	0.000
2	Small class posts	63.83			
3	Pre class big	42.96	24.28	18.478	0.000
4	Great class post	67.24			

Based on the student response questionnaire after participating in learning using SENDI media, the following classification results were obtained (see Table 9).

Table 9. Student Responses to SENDI Media

Yes	Criteria	Frequency	(%)
1	Excellent	48	80
2	Good	10	16.7
3	Pretty good	2	3.3
4	Not Good	0	0
Quantity		60	100

The results of the opinion questionnaire or student response to the SENDI media show that most of them respond very well to the media. From the results of the research questionnaire, it is known that 80% think or respond that the learning media used is very good. There were 48 students who gave very well to the media. There were 16.7%

responses with the good category or with a total of 10 students. There were quite good responses as much as 3.3% while there were no bad responses.

Discussion

Based on the results of the study, it is known that the model that has been developed is effective for student learning in rhythmic activity courses. The learning media used has been statistically proven to improve the competence of rhythmic gymnastics graduation in students. The media was tested using small classes and large classes. From the results in the two classes, statistically it shows that there is a significant difference in the average ability of rhythmic rhythmic gymnastics in students. Statistically, the hypothesis test results of the SENDI media trial obtained a significant value of 0.000, which means that the model can significantly improve the graduation competence of rhythmic gymnastics in students. The competence of rhythmic gymnastics graduation in students, especially the basic movements that students have before being given learning using the SENDI media of rhythmic gymnastics shows a significant increase. This learning media can also be effectively used by lecturers. The results of the study are known to be tested by using 3 lecturers of rhythmic courses. Based on the lecturer's responses or responses, it shows that the developed model, namely the SENDI media of rhythmic gymnastics, helps lecturers in teaching. This media is effectively used to overcome these problems. In addition, this model can be used on other materials and is flexible in its use.

Learning media is a guideline for teacher designers and teachers in carrying out learning (Aqib, 2023). Educators to choose learning media are greatly influenced by the nature of the material to be taught, and are also influenced by the goals to be achieved in the teaching as well as the level of ability of students (Sulistianingrum et al., 2023). In addition, each learning media also has stages (syntax) that students can do with the guidance of the teacher. So that learning media serves as a guideline for learning designers and learners in planning and implementing learning activities (Rokhman & Ahmadi, 2020).

Educators in the use of learning media in the teaching and learning process can arouse new interests and desires, arouse motivation and stimulation of learning activities, and even bring psychological influences to students (Nalita et al., 2024). The results of this study are in line with the opinion (Hendrasswari & Ardiyanto, 2025) that learning media can encourage learners to be more responsible and in control of their own learning, and take a learner's long-term perspective on their learning. Learning media can be described as media that contains information or instructional messages and can be used in the learning process. Learning media is a media that conveys messages or information that contains learning purposes or objectives. Learning media is essential to help learners acquire new concepts, skills and competencies (Son, 2025).

Learning media is a message carrier technology that can be used for learning purposes, learning media is a physical means to convey subject matter. Learning media is a means of communication in print and sight and hearing, including hardware technology (Rusman, 2017). The results of the study are in line with the opinion (Slameto, 2021) that learning media has the function of visual media attention is the core, which is to attract and direct students' attention to concentrate on lessons related to the meaning displayed or accompanying the text of the

subject matter. Learning media has an affective function, visual media can be seen from the enjoyment of students when learning (or reading) illustrated texts. Learning media has a cognitive function, visual media can be seen from research findings that reveal that visual symbols or images facilitate the achievement of goals to understand and remember or the message contained in images. Learning Media also has a compensatory function of learning media, as can be seen from the results of the research that visual media that provide context to understand the text helps students who are weak in reading to organize information in the text and recall it.

The results of the study show that with SENDI media, the mahassiwa can learn rhythmic gymnastics by directly looking at the movements in the video. It becomes easier for students to learn to follow rhythmic gymnastics movements. This result is in line with the opinion (Son, 2025) that learning media helps facilitate learning for students and educators, provides more real experiences (abstract to concrete), attracts students' attention and interest in learning, and can arouse the similarity between theory and reality.

The purpose of using learning media is also as a tool used by teachers to convey messages to learners so that the message reaches learners well. The existence of learning media makes it easier for teachers to carry out the teaching and learning process (Siregar, 2025). Educators have a variety of tools and strategies that are used as learning media, especially in today's modern era, where sophisticated equipment, ranging from audio, visual and audio-visual media (Setiawan et al., 2025). Educators in carrying out teaching and learning activities should use learning media to carry out the teaching and learning process so that learning goals are achieved, and efforts to improve. Through various learning methods and media, learners will be able to interact a lot actively by utilizing all the potentials that students have, of course the media used in the process and to achieve educational goals. In essence, learning media is also a communication medium because the educational process is also a communication process (Raehang et al., 2025). In particular, learning media also plays an important role in achieving certain learning goals and increasing student motivation. Not all educational media are learning media, but every learning media must include educational media.

The learning media in this study SENDI is used in channeling messages and can stimulate students' attention, interests, thoughts, and feelings, in emphasizing the subject matter, so that it can arouse interest and motivation in following the teaching and learning process. In addition, the use of learning media will also provide lightness and convenience for educators in presenting and learning students. So that learning will be more centered on students rather than educators. Students will be able to carry out developmental activities in learning such as observing and communicating. That way teachers will be able to improve their role as teachers and educators (Hafiz et al., 2025). However, determining and choosing the best media in the teaching and learning process is important. Learning media is also one of the elements or components in the learning system.

The results of the study show that SENDI media is effective in delivering more standardized messages, teaching can be interesting, learning becomes more interactive, learning implementation time can be shortened, learning quality can be improved, the learning process can be carried out anytime and anywhere, students' positive attitudes towards learning materials and processes can be improved, and the role of teachers becomes productive and positive.

Conclusion

The results of the development of rhythmic gymnastics learning media based on digital gymnastics android (SENDI) show that the media is suitable for use. SENDI media has been proven to be effective in improving rhythmic gymnastics skills in students. The results of the statistical test showed that there was a significant difference in the average rhythmic gymnastics ability of students before and after learning using SENDI media. Educators, especially lecturers at the State University of Medan, can use digital media to help students in participating in learning activities.

Recommendations

Based on the research findings indicating that the SENDI Android-based learning media proved valid (92%), practical (96%), and effective ($p < 0.001$) in improving students' rhythmic gymnastics competence, several recommendations are proposed for further development. First, for higher education institutions, it is recommended that M-Gym be systematically integrated into physical education curricula as part of the digital transformation strategy in line with Ministerial Regulation No. 53 of 2023 on Quality Assurance in Higher Education. This integration will strengthen the implementation of interactive, flexible, and student-centered digital learning environments. Second, for lecturers and physical education practitioners, this study recommends the use of SENDI as an innovative alternative to overcome the limited time available for practical sessions and to enhance students' opportunities for independent training. Lecturers are encouraged to adapt this model to other subjects, such as floor gymnastics, fitness training, or team sports, using mobile learning approaches and student-centered pedagogies. Third, for researchers and educational technology developers, SENDI can be further enhanced by incorporating advanced features such as *augmented reality (AR), motion feedback systems*, and *AI-based coaching* to provide real-time corrections and personalized movement analysis, thereby improving the precision and effectiveness of motor skill learning. Fourth, for future researchers, it is recommended to expand the study population and context to multiple universities and conduct longitudinal studies to evaluate long-term skill retention and the sustained impact of digital media on students' motivation and performance. Overall, this research highlights the importance of collaboration among lecturers, students, and technology developers in creating an innovative, adaptive, and sustainable digital learning ecosystem for physical education, supporting the ongoing transformation of higher education in the digital era.

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