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The Development of Interactive Learning Multimedia for Pencak Silat Using Google Sites

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Abstract

The objective of this study was to develop an Interactive Learning Multimedia on Pencak Silat using the Google Sites platform, addressing the need to preserve and promote Pencak Silat as a vital part of cultural heritage and to combine physical fitness with mental discipline and moral education for the learners. The researcher employed the Research and Development (R&D) methodology with the ADDIE approach. The study involved 39 participants, including academics serving as media and learning experts, an academic validator, a high school teacher as a material expert/practitioner, and 35 Physical Education teachers from the High School Teacher Association of Landak Regency as end users. Data collection tools included observation sheets, interview guidance, questionnaires, and assessment sheets for experts and users. The data analysis encompassed both qualitative and quantitative methods. The evaluation by the material expert indicated that the product was deemed suitable for use and was of excellent qualification. The multimedia expert stated that the product was fitting for use with a good criterion. The learning expert affirmed that the product was suitable for use with an excellent qualification. User assessments also resulted in excellent qualifications. Based on the research findings, the conclusion is drawn that the Google Sites platform of Interactive Learning Multimedia for *Pencak Silat* is well-suited for educational purposes. The utilization of this interactive multimedia in learning is highly adaptable to the demands of the modern era, enabling individuals to learn at any time and place without being constrained by space, distance, or time.

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INTRODUCTION

Education is a guided learning process aimed at fostering the development of individuals into independent, responsible, creative, knowledgeable, virtuous, and both physically and spiritually healthy human beings (Fluerentin, 2012). Physical Education is a mandatory component in educational curricula at both primary and secondary levels. It involves engaging students in physical activities to advance their knowledge, skills, and attitudes (Mustafa, 2021). The process of Physical Education is designed to improve physical fitness, motor skills, and knowledge, and promote healthy and active lifestyle behaviors, sportsmanship, and emotional intelligence (Abduljabar, 2011). The realm of Physical Education, now referred to as *Pendidikan Jasmani Olahraga dan Kesehatan* (PJOK), encompasses subjects such as games and sports, including martial arts content like *Pencak Silat* (Permendikbud, 2018).

Given the extensive content within *Pencak Silat*, not all of its elements align with the instructional objectives for teaching martial arts in schools. Key subjects with specific parameters include (1) Knowledge and understanding of *Pencak Silat*, (2) *Pencak Silat* Skills, and (3) Mental Development (Ihsan, 2018). The *Pencak Silat* curriculum for 11th-grade high school students under *Pendidikan Jasmani Olahraga dan Kesehatan* (PJOK) encompasses materials such as stances, punches, kicks, dodges, and blocks (Sumaryoto & Nopembri, 2017). Teaching *Pencak Silat* within the classroom context poses distinct challenges, considering the complexity arising from varying levels of student willingness and motivation to learn. This stands in contrast to teaching *Pencak Silat* in extracurricular activities and specialized training at *Pencak Silat* schools. In addition to practical activities, the utilization of suitable learning resources significantly influences the overall learning outcomes.

The use of Google Sites as a platform for teaching *Pencak Silat* is essential in addressing these challenges by providing a comprehensive and interactive learning environment. Mayer (2009) in Wan Ali & Wan Yahaya (2022) explains that interactive learning using text, images, audio, and video can enhance student engagement and understanding. This aligns with the diverse needs of *Pencak Silat* instruction, which requires both theoretical and practical components to be effectively conveyed. Moreover, Harjanto & Sumarni (2019) in Okmawati (2020) emphasize that web-based platforms like Google Sites offer a simple and user-friendly interface, allowing educators to create and share instructional materials easily. This includes interactive content such as instructional videos, step-by-step guides, and quizzes on *Pencak Silat* techniques and philosophies. By leveraging these features, Google Sites not only supports the effective dissemination of learning materials but also accommodates varying levels of student motivation and learning preferences, ultimately enhancing the overall learning experience.

In Research and Development, several critical points underscore the imperative for undertaking development initiatives, and one of these points is the necessity for a needs analysis. The initial data analysis revealed the following outcomes: 1) A significant portion of students (40%) face challenges in comprehending the material when relying solely on books as a medium, with the majority (60%) expressing a preference for learning *Pencak Silat* through videos. Additionally, all students (100%) expressed the need for suitable learning media in *Pencak Silat* lessons. 2) A considerable percentage (70%) of Physical Education teachers exhibit a limited mastery of the *Pencak Silat* material they teach. Moreover, 85% of these teachers rely on knowledge derived from modules, textbooks, and their experiences during college. Notably, 60% of teachers omit *Pencak Silat* material in their teachings, 75% have never created learning media for *Pencak Silat*, and 100% feel the necessity for Interactive Multimedia in *Pencak Silat* learning.

Information technology serves as a fundamental component within information systems and in the educational process which can extend beyond traditional classroom settings through the utilization of multimedia (Mursidi et al., 2018). One avenue for supporting physical education learning is through the utilization of Internet networks, particularly in the form of E-modules, which can facilitate the process of physical education learning (Mustafa, 2021). Google Sites, a personal website platform, can be employed as a learning medium (Mustafa, 2021), and previous research indicates its utility for both offline and online learning by teachers and students (Mustafa, 2021); (Harsanto, 2014).

Many studies have been conducted in the area of multimedia interaction, especially in physical education. Lestari & Lanos, (2020) conducted a study to investigate the student's perception when they were taught Pencak Silat by using multimedia interactive. The result of the study indicated that interactive multimedia can address limitations related to time constraints and learning resources in the educational process. The interactive multimedia-based learning model for basic Pencak Silat techniques can serve as a valuable reference for lecturers, trainers, students, and the wider community in mastering fundamental pencak silat skills.

Another study found that Interactive multimedia model has a good impact on students' basic movement skills in Pencak Silat for junior high school students. the students showed a positive attitude when the teacher use video in teaching Pencak silat. The students can easily understand the basic movement in Pencak silat since they can see the real action or movement in the video (Lanos et al., 2023).

In light of the needs analysis, it is necessary to have an improvement in the utilization of media in teaching *Pencak Silat*. The development of interactive learning media, particularly through multimedia and online platforms, are expected can enhance the students' understanding and engagement in learning *Pencak Silat*. Therefore, the development of Google Sites-based teaching media needs to be carried out to ensure that *Pencak Silat* learning can be effectively facilitated. There is an opportunity to develop a learning medium specifically addressing the Pencak Silat material for 11th-graders.

METHODS

This research utilizes the Research and Development (R&D) method, a research approach designed to create a particular product and assess its effectiveness (Sugiyono, 2020). The R&D method involves conducting a needs analysis to identify specific requirements for the product and evaluating its effectiveness to ensure its functionality within the broader community. The development process follows the structure of the ADDIE development model, as outlined by Robert Maribe Branch, comprising five stages: 1) analysis, 2) design, 3) development, 4) implementation, and 5) evaluation (Branch, 2009).

The research involves a total of 39 participants, including two academics serving as experts in learning and media, one academic acting as the instrument validator, one high school teacher serving as the subject matter expert, and 35 Physical Education teachers from the High School Teacher Association of Landak Regency participating as users. The two academics are qualified to be experts because of have knowledge, degrees and experience in the field of technology and teaching *Pencak Silat*. the teacher is selected as the subject matter expert because of possessing the academic qualifications and experience in their respective fields so the teacher is knowledgeable in the teaching content.

The instruments used include questionnaires, interview sheets, and assessment sheets from subject matter experts, media experts, learning experts, user assessments (teachers), and observation sheets. The

questionnaire was in the form of a closed-ended questionnaire while the interview was in semi structured interview. The indicators of the questionnaire can be seen as follows:

Table 1. The Indicators Of The Observation

No	Observation Indicators	Yes	No
1	The presence of accurate body movements according to the teacher's instructions.		
2	Capable of analyzing acquired knowledge.		
3	Capable of expressing ideas/opinions.		

The Observation was conducted to gain information about students' initial condition when they were teaching by using previous teaching media. this action was conducted in order to make a conclusion or connection to the interview results of their teaching media preferences and the real conditions that occur before the use of Interactive learning multimedia.

The questionnaire is used to conduct a needs analysis, which can be seen in the following table:

Table 2. Needs Analysis Of The Questionnaire

No	List of Questions	Yes	No
1	Do you think that Physical Education (PJOK) teachers should be required to master <i>Pencak Silat</i> techniques?		
2	Do you master various <i>Pencak Silat</i> techniques solely through Physical Education (PJOK) textbooks or experiences from attending <i>Pencak Silat</i> courses?		
3	Have you ever participated in <i>Pencak Silat</i> training or joined a <i>Pencak Silat</i> school?		
4	Do you understand the entirety of the <i>Pencak Silat</i> material that will be taught?		
5	Do the majority of students master the <i>Pencak Silat</i> material that is taught?		
6	Have you ever created educational media (modules/handouts, books, videos, interactive media, etc.) on the subject of <i>Pencak Silat</i> ?		
7	Have you ever skipped <i>Pencak Silat</i> material in school (not taught)?		
8	Do you think interactive multimedia learning materials for <i>Pencak Silat</i> in Physical Education and Health classes are needed?		

Explanation: Check one (yes/no)

Interviews are used to determine the level of teachers' understanding regarding *Pencak Silat* material. The list of questions can be seen in the following table:

Table 3. Interview Questions List

No	Questions
1	Describe the teacher's experience when teaching <i>Pencak Silat</i> material.
2	How does the teacher teach the practice of <i>Pencak Silat</i> ?
3	What kind of learning media is needed to teach <i>Pencak Silat</i> material?

The expert assessment sheets are used to justify whether the product is suitable for use or not. Additionally, expert assessments are conducted to obtain input and suggestions for improvement/refinement of the product. The question grids for the media expert assessment can be seen in Table 3, for the subject material expert assessment in Table 4, and for the learning expert assessment in Table 5.

Table 4. Multimedia Expert Instrument Grid

No	Assessment Aspect	Question Number
1	Suitability in terms of Language/Writing	1,2,3
2	Suitability in terms of Presentation	4,5,6,7,8
3	Suitability of Media Effects on Learning Strategies	9,10,11,12,13,14,15
4	Overall Media Quality	16,17,18,19,20

Qualitative data was obtained from interviews and suggestions and feedback collected through expert and user (students and teachers) questionnaires. Both quantitative and qualitative data were used in the process of improving and refining the product. Expert data analysis was conducted by converting qualitative data into quantitative data using the Likert scale with the range 1 = Very Poor; 2 = Poor; 3 = Fair; 4 = Good; and 5 = Very Good (Nemoto & Beglar, 2014).

Table 5. Subject Material Expert Instrument Grid

No	Assessment Aspect	Question Number
1	Quality of the Presented <i>Pencak Silat</i> Techniques	1,2,3,4,5,6
2	Level of Effectiveness of <i>Pencak Silat</i> Movements based on Standard Techniques	7,8,9,10
3	Quality of Movements based on Biomechanics	11,12,13,14
4	Quality of Presented <i>Pencak Silat</i> Material	15,16,17,18,19,20

Table 6. Learning Expert Instrument Grid

No	Assessment Aspect	Question Number
1	Content Quality/Material	1,2,3,4,5,6,7,8
2	Learning Objectives	9,10,11
3	Activities and Evaluation	12,13,14,15,16
4	Motivation	17,18,19,20

Table 7. User Instrument Grid

No	Assessment Aspect	Question Number
1	The Role of Multimedia	1,2,3,4,9
2	User Convenience	5
3	Content Relevance	6
4	The Role of Images and Videos	7
5	Multimedia Integration	8
6	Overall Quality	10

In the Analysis phase, crucial information is collected through a Needs Analysis. The Design phase involves translating concepts into a detailed formulation that describes the learning media, and the specific format depends on the type of media being developed. Designing interactive learning media includes tasks

such as selecting the software/platform, compiling digital content, creating interface flowcharts and storyboards, and finalizing the product's packaging.

Advancing to the third stage of the ADDIE development model, Development involves creating an initial product, specifically a draft of the Google Sites-based interactive learning multimedia designed for 11th-grade Physical Education focusing on *Pencak Silat*. This draft is by the product design established during the design phase.

The Implementation phase unfolds once the Google Sites platform of Interactive Learning Multimedia is deemed suitable by experts. It undergoes testing by Physical Education teachers associated with the High School Teacher Association for Physical Education, Sports, and Health in Landak Regency.

In the Evaluation phase, a thorough analysis is conducted by reviewing user assessments of the developed learning media. These analysis results serve as the basis for product improvement. Furthermore, the evaluation outcomes serve as justification for the quality of the learning multimedia based on the collected data.

The data collection techniques used in this research include observation, interviews, and the use of a questionnaire. The observation was conducted to observe the learning process. Meanwhile, the interviews are conducted to analyze the need for the development of materials and the development of Interactive Learning Media of *Pencak Silat*. On the other hand, the use of the questionnaire aims to assess the quality and feasibility of multimedia based on the evaluation of subject matter experts/practitioners, learning experts, and multimedia experts.

The types of questions in the interview is semi-structured where the subjects are asked about whether they used media previously in the learning process, their experience in adapting the teaching media, and what kind of teaching media is needed to support them in teaching *Pencak Silat*. Moreover, the researcher observes the learning activities based on three indicators which include; (1) Performing body movements correctly according to the teacher's instructions; (2) Ability to analyze the knowledge acquired; and (3) Ability to express ideas/opinions.

In analyzing the data, quantitative and qualitative techniques of data analysis were administered. Descriptive analysis is employed to depict multimedia learning. The data were gained from all research subjects, including practitioner experts, learning experts, multimedia experts, and users (students and teachers).

Qualitative data are derived from interviews as well as suggestions and input obtained from experts and users through questionnaires. Both quantitative and qualitative data are utilized for product improvement and refinement processes. The expert data analysis is conducted by converting scores initially in qualitative form into quantitative data using the Likert scale rules.

Next, determine the average scores obtained from the questionnaires of practitioner experts, learning experts, multimedia experts, and user responses (students and teachers) (Arikunto, 2005: 264). Both quantitative and qualitative data are utilized for the product improvement and refinement processes. The steps taken in quantitative data analysis are as follows:

- (1) Calculate the total average score for each component using the formula:

$$Xi = \frac{\sum x}{n}$$

- (2) Explanation:

X_i = Score rating for component
 $\sum x$ = Sum of scores for the component
 n = Number of variables

Calculate the average scores for each component by converting the average scores into quantitative form. The obtained scores are converted into quantitative data on a five-point scale based on the following formula:

Table 8. Quantitative Data Conversion

Formula	Average Score	Classification
$X > X_i + 1.8x_{sbi}$	> 4.2	very good
$X_i + 0.6x_{sbi} < X \leq X_i + 1.8x_{sbi}$	$> 3.4 - 4.2$	good
$X_i - 0.6x_{sbi} < X \leq X_i + 1.8x_{sbi}$	$> 2.6 - 3.4$	adequate
$X_i + 1.8x_{sbi} < X \leq X_i + 0.6x_{sbi}$	$> 1.8 - 2.6$	poor
$X \leq X_i - 1.8x_{sbi}$	≤ 1.8	very poor

Based on the above assessment criteria, the standards for the quality of interactive multimedia products are obtained as follows: (1) Interactive learning multimedia products developed are declared excellent if the average score is equal to or greater than 4.2, (2) Interactive learning multimedia products developed are declared good if the average score is between 3.4 to 4.2, (3) Interactive learning multimedia products developed are considered sufficient if the average score is between 2.6 to 3.4, (4) Interactive learning multimedia products developed are declared not good or not suitable if the average score is between 1.8 to 2.6, (5) Interactive learning multimedia products developed are declared very poor or very unsuitable if the average score is less than or equal to 1.8.

RESULT AND DISCUSSION

The result of developing Interactive Multimedia *Pencak Silat* by using Google Sites is digital data that can be accessed using the internet. This data can be accessed through a link shared by the developer to the users, and then packaged in the form of a manual book with a QR Code. The Interactive learning *Pencak Silat* Multimedia using Google Sites contains *Pencak Silat* learning materials form of text, images, and videos equipped with quiz menus, assignment submissions, and final evaluations.

A. The Result of Need Analysis

In analyzing data for needs analysis, researchers employ various data collection techniques.

1) Analysis based on interview

Observation results on the *Pencak Silat* material in the 11th-grade students indicate that 53% of students appear to be less focused during lessons. These observations were obtained based on the average value of observations, which consist of 3 assessment indicators, namely: 1) Body movements appropriate to the teacher's instructions, 2) Ability to analyze acquired knowledge, 3) Ability to express ideas/opinions

The results of the three assessment indicators can be seen in the following table:

Table 9. Observation Table of Attitude Values

No	Observation Indicators	Yes	No
1	The presence of accurate body movements according to the teacher's instructions.	50%	50%
2	Capable of analyzing acquired knowledge.	55%	45%
3	Capable of expressing ideas/opinions.	36%	64%
Average		47%	53%

Based on the observation results, it was found that 50% of students do not perform movements according to the teacher's instructions, 45% of students are unable to analyze acquired knowledge, and 64% of students are unable to express ideas/opinions from the learning outcomes. After the observation, a brief interview was conducted with 5 randomly selected students, who are part of the 53% of students with the lowest scores among all students.

An interview was also administered to gain information about the students' understanding of teaching by using previous media, and what kind of teaching media they prefer to have in the future. After communicating with these 5 students through a brief interview, several statements were summarized as follows: some students (40%) have difficulty understanding the material if only using book media, the majority of students (60%) require videos in learning, and all students (100%) need appropriate multimedia for learning *Pencak Silat*.

Based on the results of observations and interviews, students' attitudes in participating in Pencak Silat lessons using books or handouts as media are indicated to be low. This is evident from the low students' performance in Pencak Silat instruction, their difficulties in analyzing the required knowledge, and their low ability to express their ideas. As explained by Kivuti (2021) that based on the study the students' percentage on the preferences of using textbook during teaching and learning was considered as low. Soon and Kong (2018) in Rodríguez et al. (2022) added that illustrations and the centre of mass concepts in textbooks can lead to misunderstanding and could disorient the pedagogical practices of Physical Education teachers. It was suggested that in order to better reflect the true centre of body movement, future reference materials should incorporate anatomical and bio-mechanical knowledge in the preparation of figures.

2) The Analysis of Survey (Questionnaire)

Other high schools in the Landak Regency also experience the learning problems faced by these students. Similarly, several Physical Education (PJOK) teachers from high schools in Landak, who are members of the Physical Education Teachers Working Group (MGMP PJOK) in the Landak Regency, expressed similar sentiments. Based on these issues, a further needs analysis was conducted by distributing a questionnaire to physical education teachers regarding *Pencak Silat* material using Google Forms. The aim is to determine the importance of *Pencak Silat* learning multimedia in the MGMP PJOK of high schools in the Landak Regency and to assess the understanding of PJOK teachers in the Landak Regency regarding *Pencak Silat* material. The needs analysis involved 20 respondents, representing approximately 57.14% of the total MGMP members, and the questionnaire was distributed using Google Forms. Here are the results of the needs analysis obtained:

Table 10. Table of Need Analysis Results

No	Questions	Yes	No
1	Do you think that Physical Education (PJOK) teachers should be required to master <i>Pencak Silat</i> techniques?	100%	0%
2	Do you master various <i>Pencak Silat</i> techniques solely through		
3	Physical Education (PJOK) textbooks or experiences from attending <i>Pencak Silat</i> courses?	85%	15%
4	Have you ever participated in <i>Pencak Silat</i> training or joined a <i>Pencak Silat</i> school?	40%	60%
5	Do you understand the entirety of the <i>Pencak Silat</i> material that will be taught?	30%	70%
6	Do the majority of students master the <i>Pencak Silat</i> material that is taught?	80%	20%
7	Have you ever created educational media (modules/handouts, books, videos, interactive media, etc.) on the subject of <i>Pencak Silat</i> ?	25%	75%
		60%	40%
8	Have you ever skipped <i>Pencak Silat</i> material in school (not taught)?	100%	0%
9	Do you think interactive multimedia learning materials for <i>Pencak Silat</i> in Physical Education and Health classes are needed?		

From the table above, several crucial points serve as references for developing interactive multimedia learning for *Pencak Silat*. These include; 70% of Physical Education teachers having incomplete mastery of the *Pencak Silat* material they teach, 85% of Physical Education teachers only having a grasp of *Pencak Silat* material based on modules or textbooks and experiences during their studies, 60% of teachers having missed out on *Pencak Silat* material (not taught), 75% of Physical Education teachers have never created learning media, and 100% of teachers thought that Interactive Multimedia Learning for *Pencak Silat* is needed.

To support the physical education teacher in teaching *Pencak Silat* Lanos et al., (2023b) explained that the use of interactive multimedia will support the teacher in teaching body movement especially in *Pencak Silat*. It is because the interactive multimedia is presented and emphasizes the clarity of images and text so that students can understand the motion learning easily, and the audio music presented in the application is made with the suitability of movements of *pencak silat*. (Lanos et al., 2023b) also added that to attract student motivation in learning, learning videos in the application presented with normal movements and accompanied by slow motion can make students easy to learn.

3) Analysis based on Preliminary Study (literature review)

In addition to conducting analyses through interviews, observations, and surveys, the researcher also conducted a preliminary study to determine the platform or software that will be used in the development of the interactive multimedia product. Through the preliminary study, which includes a literature review, several important points were summarized and can be seen in Table 10 as follows:

Table 11. Summary of The Literature Review Results

No	Author	Title	Study Result	Conclusion
1	Prayogi Dwina Angga (2020)	<i>Pengembangan Bahan Ajar Multimedia Pembelajaran Interaktif Pencak Silat Berbasis CourseLab2.4</i>	<i>Pencak Silat</i> Learning Multimedia Product based on CourseLab 2.4	The trial results achieved a score of 93.83%, meeting the validity criteria, and no repetitions were necessary.
2	Riko Valentino (2018)	<i>Pengembangan Media Pembelajaran Pencak Silat Berbasis Macromedia Flash 8 Untuk Sekolah Menengah Pertama</i>	Physical Education learning media product based on the macro media flash 8 app. with <i>Pencak Silat</i> material.	There is an improvement of 29.53% between the pre-test and post-test scores. The resulting multimedia is suitable and effectively used.
3	Ricky Anugra Akbar (2020)	<i>Pengembangan Media Pembelajaran Pencak Silat Berbasis Multimedia Tingkat SMA/MA</i>	A multimedia-based learning media using the Adobe Flash CS5 application.	Interactive multimedia provides effective learning outcomes and can enhance students' motivation and interest in learning.
4	Vega Mareta S (2022)	Interactive Multimedia Development as <i>Pencak Silat</i> Learning Media for Grade V Students of SDN 7 Pule	<i>Pencak Silat</i> Learning Media for Grade V students of SDN 7 Pule.	The research results obtained a percentage score of 97.39%, with an assessment of excellent and deemed suitable for use.
5	IG Suwiwa (2014)	Development of Interactive Multimedia Learning for Theory and Practice of <i>Pencak Silat</i> Course	Multimedia teaching materials for theory and practice of <i>Pencak Silat</i>	The development of multimedia obtained a percentage score of 100% in the category of excellent.
6	Liberta Loviana Carolin (2020)	The Development of Learning Video Media Using the ADDIE Model on Basic	Instruction-al video media on basic kicking techniques in <i>Pencak Silat</i> for	Research results show a dependency level of 94%, categorized as excellent, and a

		Kicking Techniques of <i>Pencak Silat</i> for Grade VII of SMPN 4 Sukasada in the Academic Year 2019/2020	learning purposes.	participation rate of 90%, also categorized as excellent.
7	Rian Triprayogo (2020)	The Development of Single Action <i>Pencak Silat</i> Media Based on Android	Instructional media for single <i>Pencak Silat</i> techniques based on a computer application equipped with a guidebook.	Field test results indicate significance < 0.5. which is categorized as an excellent
8	Eka Narima Ricky (2021)	The Development of Multimedia-Based <i>Pencak Silat</i> Learning Application	Visual Basic 6.0 and Smart Apps Creator 3	After using the application, it is concluded that there is a significant improvement in learning outcomes.
9	Adek Arifin Harahap (2021)	Android-Based <i>Pencak Silat</i> Learning Model	Android Module for Middle School Students Accessible via Android Smartphone	The Android module can enhance the effectiveness, interest, and participation in student learning.
10	Oktafia Setiaji (2022)	Development of Integrated Religious-based Physical Education E-Learning Based on Moodle with <i>Pencak Silat</i> Topics	The e-learning platform is called Moodle.	E-learning products have been proven effective in enhancing learning effectiveness.

In general, the abstracts of the 10 reviewed journals state that interactive multimedia is effective in enhancing students' learning abilities. From the literature review results, it is stated that all previously developed multimedia used an offline operating system. Considering the increasing use of Google Sites as a direct (real-time) and fast information delivery media (Ferismayanti, 2020), the development of interactive multimedia using Google Sites is chosen.

B. The Result of Product Development

Several stages must be completed before the product can be tested by users (students123 and teachers). The stages of product development include creating drafts/designs, making revisions, and producing the initial product.

1) Design of Interactive Multimedia

As an initial step before product development, a product design in the form of a draft of interactive learning multimedia (MPI) is created. The MPI includes various basic techniques of *Pencak Silat* according to the Physical Education subject for Grade XI in high school (stances, footwork patterns, attack techniques, defense techniques, and falling techniques). The MPI is also supplemented with various additional videos linked to the interactive learning multimedia (MPI), as well as additional materials about other aspects of *Pencak Silat* knowledge (definition and elements, brief history, organization, and competition regulations of *Pencak Silat*).

Based on the assessment of the MPI draft by the material experts/practitioners, stances and footwork patterns are considered suitable for use, while in attack techniques, defense techniques, and falling techniques, various paired exercises and the use of equipment such as punching bags need to be added.

2) Revision of Interactive Multimedia

After assessing the draft of the interactive *Pencak Silat* learning multimedia, the researcher revised it according to the suggestions and input from *Pencak Silat* material experts/practitioners.

The menu display of techniques after and before revision can be seen as follows:



Fig. 1 The menu display before the revision



Fig. 2 The menu display after the revision

From the figure above, several videos of variations of defense-attack techniques using a punching box, paired defense-attack technique exercises, and variations of paired falling technique exercises were added.

3) The product of Interactive Multimedia

After revising, the initial product of Interactive *Pencak Silat* Learning Multimedia is packaged comprehensively with various menu options included. At this stage, the initial product is generated based on the revised content/materials from the material experts/practitioners. The initial product display before being assessed by experts can be described as follows:



Fig 3. The initial display of MPI



Fig 4. The menu display of MPI

4) Product Feasibility

Before conducting a tryout on students and teachers from the MGMP PJOK of Landak Regency, the initial product produced was first evaluated by three competent experts in their fields. The expert assessments include assessments by the material experts/practitioners, multimedia experts, and learning experts. Feasibility is an important factor in teaching media utilization. Nuraini & Rezaki (2023) stated that the feasibility of a teaching media make the students understand learning more efficiently and positively impacts the development of learning values and creativity.

C. The Result of Research Instrument Assessment

Before the instrument assessment for the material experts/practitioners, multimedia experts, and learning experts were used in the study, instrument validation was conducted first. The result of instrument validation is as follow:

Table 12. Summary of Instrumen Validation

No	Material	Tools	Material Presentation	Expert Statement
1	Stance	Matrass	Images: Displaying images of various Pencak Silat stance techniques. Video: Displaying videos of various Pencak Silat stance techniques. Text: Providing movement descriptions according to the presented images and videos.	Suitable for use
2	Step Patterns	Mat	Video: Displaying videos of various Pencak Silat step pattern techniques. Text: Providing movement descriptions according to the presented images and videos.	Suitable for use
3	Attack	Mat,	Video: Displaying videos of various	Use real videos

	techniques	Punching Box, Body Protector	Pencak Silat attack techniques. Text: Providing movement descriptions according to the presented images and videos.	
4	Defense techniques	Mat, Punching Box, Body Protector	Video: Displaying videos of various Pencak Silat defense techniques. Text: Providing movement descriptions according to the presented images and videos.	Add training variation techniques

The instrument validators also conducted various studies before validating the instruments to be used, reviewing the revised thesis proposal, instrument grids, and assessment instruments. After validating the research instruments, the validators stated that the instruments were suitable for use. Additionally, the validators assessed that the instruments are good and can be used immediately without any need for improvement or suggestions/input.

In developing teaching media, experts who are experienced in their field make huge contributions. one of them is to give their judgment or validation to the developed teaching media. Kurilovas et al. (2014) in (Safitri et al. (2022) supported that the process of evaluation and validation by experts is crucial to ensuring that the developed teaching media meet established quality standards. These experts possess extensive knowledge and experience in the field relevant to the learning media.

D. The Result of Evaluation from the Practitioner

After the instruments were deemed suitable for use in the research, the product was assessed by the material experts/practitioners. After reviewing the multimedia product, subject matter experts/practitioners provided assessments covering 4 evaluation aspects: 1) Quality of the presented *Pencak Silat* techniques, 2) Level of effectiveness of *Pencak Silat* movements based on standard techniques, 3) Quality of *Pencak Silat* movements reviewed based on Biomechanics, 4) Quality of the presented *Pencak Silat* materials. From the assessment by the material experts, a score of 4.75, or 95% of the maximum score was obtained, with the qualification of Excellent.

The conclusion from the material expert is that the development of Interactive Learning Multimedia by using Google Sites is suitable for use/conducting field trials with revisions/improvement suggestions. The feedback/input from the material experts/practitioners is as follows: 1) Considering that revisions have been made according to suggestions and input in the previous stage, the overall product is now ready for testing, 2) To enhance the product's usefulness, it is suggested to supplement the content with (a) additional supporting videos from the internet, including the used reference sources, (b) also include the latest rules of *Pencak Silat* according to the IPSI Congress.

E. The Result of Evaluation from Multimedia Experts

The assessment covers 4 evaluation aspects: 1) Suitability of the Linguistic/Written Aspect in the Media, 2) Suitability of the Media Presentation Aspect, 3) Suitability of Media Effects on Learning

Strategies, and 4) Overall Media Quality. From the assessment by multimedia experts, an average score of 4 or 80% of the maximum score was obtained, with the qualification of Good.

The conclusion based on the assessment conducted by multimedia experts states that the development of Interactive *Pencak Silat* Learning Multimedia by using Google Sites is deemed suitable for use/conducting field trials with revisions according to improvement suggestions. The improvement suggestions provided by multimedia experts are: 1) Add contact information connected to subject teachers such as email, WhatsApp, and others, so that students can consult in real-time (interactively). 2) Adjust the menu buttons to fit the media display.

F. The Result of Evaluation from Learning Experts

The assessment by learning experts covers 4 aspects: 1) Content/Material Quality, 2) Learning Objectives, 3) Activities and Evaluation, and 4) Motivation. From the assessment by learning experts, a score of 4.6, or equivalent to 92% of the maximum score was obtained, with the qualification of Excellent.

The conclusion from the learning experts' states that the development of Interactive *Pencak Silat* Learning Multimedia by using Google Sites is suitable for use with revisions according to improvement suggestions. The improvement suggestions provided include that quiz and evaluation menus should consider Bloom's Taxonomy thinking levels (C1, C2, C3, and C4).

Based on the assessment results from the experts, the product is deemed suitable for use in the research. The overall summary of assessment results, which includes assessments from subject matter experts, multimedia experts, and learning experts, can be seen as follows:

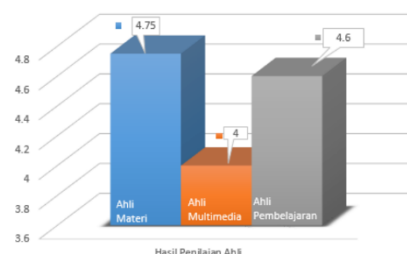


Fig 5. The result of expert judgment

G. The Multimedia tryout

After the product was revised according to the suggestions and input from experts and deemed suitable for use or field testing, the product was tested on 22 students of eleventh grade and 35 teachers from the MGMP PJOK in senior high school.

1) The result from tryout to the students

Before assessing the students, they were asked to observe and review the multimedia product. The assessment consists of 10 evaluation aspects including 1) Ease of learning and using multimedia, 2) Content suitability with discussion/topic material, 3) Influence of images and videos in learning, 4) Media support for independent learning, 5) Integration of multimedia in literacy skills, knowledge, skills, attitudes, and technology mastery, 6) Media role in supporting teaching and learning activities, 7) Media role in enhancing student learning motivation, 8) Media role in improving learning outcomes, 9) Media role in creating an enjoyable learning environment, 10) Overall media quality.

The results of the assessment of these 10 aspects can be seen as follows:

Table 13. The Result Of the Tryout Assessment Of Students

N	Average (Xi)										Average
	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	
22	4.5	4.5	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.68	4.54

From the average assessment by students as users, the result obtained is an average rating of 4.54 or 90.8% of the maximum score, with the category being very good. Based on this assessment, the product is declared suitable for use in learning.

2) The result from the tryout to the teachers

As with the usage test among students, the assessment of usage among teachers also includes 10 aspects of assessment. The aspects are; 1) Ease of learning and using multimedia; 2) Suitability of content with discussion/material topics; 3) The influence of images and videos in learning; 4) Media support for independent learning; 5) Integration of multimedia in literacy skills, knowledge, skills, and attitudes, as well as technology proficiency; 6) The role of media in supporting teaching and learning activities; 7) The role of media in increasing student learning motivation; 8) The role of media in improving learning outcomes; 9) The role of media in creating an enjoyable learning environment; 10) Overall media quality.

Before the product assessment, the teacher is requested to access the product through the link distributed to the WhatsApp group, after that the teachers do the assessment using the instrument via Google Form. The results of the teacher's assessment of multimedia can be seen in the following table:

Table 14. The Result of the Tryout Assessment of Teachers

N	Average (Xi)										Average
	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	
36	4.4	4.5	4.6	4.4	4.3	4.4	4.4	4.2	4.4	4.4	4.44

From the average user assessment by teachers, a rating of 4.44 or 88.8% of the maximum score was obtained, with the category being very good. Based on this assessment, the product is declared suitable for use in learning.

The process of learning *Pencak Silat* skills cannot be separated from physical activities in the form of practical exercises. These activities are closely related to motor learning. Motor learning is a set of processes associated with training or experiences that lead to permanent changes in skilled behavior (Schmidt, 1982). Motor learning is a relatively permanent change in performance or behavior related to changes in movement resulting from training or learning experiences (Jacqueline D. Goodway, John C. Ozmun, 2009).

Motor learning in Physical Education reflects a conscious activity where learning activities are directed toward achieving a predetermined goal. The stages of motor learning consist of: the cognitive stage, the associative/fixation stage, and the autonomous stage. To achieve optimal results, these three stages of motor learning must be performed sequentially (Hardiyanto & Suhardi, 2019). In the cognitive stage, students learn movements through the knowledge they acquire. In the associative stage, students practice movements according to the concepts they have previously known and understood. In the

autonomous stage, students can perform movements fluently because the motor skills they have learned previously are repeated continuously, resulting in faster, more accurate, and precise motor responses, and their movements are no longer disrupted by environmental situations.

The use of instructional media in the teaching and learning process can stimulate new interests and desires, motivate and stimulate learning activities, and even have psychological effects on students, thus aiding the effectiveness of the learning process in delivering messages and lesson content at that time (Surasmi, 2016)

The interactive multimedia developed by the researcher is a combination of several media such as text, images, animations, videos, and sound. When used to package material, it will appear more concrete, thus enabling students to learn and understand basic *Pencak Silat* techniques more easily. This is in line with the principle of multimedia development in learning, which states that students learn better when words and pictures are presented close together (Lei & Wei, 2009).

The instructional multimedia produced supports the learning process according to the stages of motor learning. The interactive *Pencak Silat* learning multimedia based on Google Sites can enhance student motivation oriented towards improving student learning outcomes. Additionally, this multimedia can facilitate teaching for teachers, making the learning process more effective and efficient.

During the process of interactive material development, the researchers found some obstacles such as gaining the appropriate videos for presenting more realistic body movements in *Pencak Silat*. Sasongko (2019) stated that a realistic *pencak silat* body movement should be captured from different angles. So, the more cameras are used the more the motion will be recorded. Sasongko (2019) also added that the core challenge of recording movement lies in producing a realistic and convincing human motion while preserving its essential characteristics. Capturing the full range of human body motion is already complex, and recording martial arts movements presents an even greater challenge. The faster the motion, the more difficult it becomes for the camera to capture it accurately.

Even so, Integrating *Pencak Silat* into schools is one effort to preserve the Indonesian heritage of martial art. Gilang (2007) in Sasongko (2019) explain that many aspects are connected to the concept of identity. *Silat* is a significant cultural identity trait, closely tied to martial arts identity. Indonesia's ancestors developed a form of self-defense designed to protect and sustain their lives or communities in the face of natural challenges. For this effort, an interactive multimedia with Google-Site needs to be developed.

CONCLUSIONS

From the series of research conducted, it can be concluded that there is a need for the development of an interactive *Pencak Silat* learning multimedia using Google Sites. This is based on the results of needs analysis conducted through interviews, observation, and questionnaires distributed to the subject of research. The review of 10 related articles also proves that *Pencak Silat* learning is an active activity that cannot be separated from physical movement. Therefore, to facilitate teachers and students in implementing *Pencak Silat* learning, the researchers use interactive learning media. This proves that the use of Google Sites as an information delivery medium is considered very good and can be used in the learning process.

CONFLICTS OF INTEREST STATEMENT

There are no conflicts of interest among the authors. All co-authors have read and approved the manuscript's substance, and there is no financial interest to declare. We certify that this manuscript is original and not under consideration by any other publication.

AUTHOR CONTRIBUTIONS

Zusyah Porja Daryanto and Suriani Sari conceptualized the idea and developed the theories. Rino Lusiyono Lucius performed the computation. Zusyah Porja Daryanto encouraged Rino Lusiyono Lucius to investigate the need for analysis and supervise the findings of this work. Suryani Sari and Rustam managed and coordinated all authors' responsibilities for the research activities. All authors discussed the results and contributed to the final manuscript.

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