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Development of Web-Based Learning Media: Physical Education, Sports, and Health (PJOK) Volleyball Subjects

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ABSTRACT

The aim of this research is to determine the feasibility of web-based learning media in the PJOK volleyball subject and the effectiveness of web-based learning media in the PJOK volleyball subject. The research uses the ADDIE Research and Development model approach (Analysis, Design, Development, Implementation, and Evaluation). The research results show: (a) web-based learning media from media expert validation with a score of 4.45, 89%, very feasible category; design expert validation with a score of 4.6 percentage 92%, very feasible category; material expert validation with a score of 4.5 percentage 90%, very feasible category; individual student trials with a score of 4.3, percentage 86%, very high category; student group trials with a score of 4.5, with a percentage of 90%, very high category. (b) The effectiveness of web-based learning media shows that there is a significant difference between student learning outcomes in experimental classes and classes without using web-based learning media at a significance level of 0.05 or 5%. The results of the T-test calculations on the posttest scores for the experimental class and control class show tcount > ttable, namely 3,225 > 1,677. It is evident from the average value of the posttest learning results for the experimental class that it is 88% higher than the posttest learning results for the control class at 64%. Thus, it can be concluded that the web-based learning media developed is effectively used to improve student learning outcomes.

KEYWORDS

Instructional media; web; volleyball; PJOK

INTRODUCTION

The use of information technology is able to produce innovation in learning methods, with the hope that the application of information technology can encourage students to develop independent learning abilities. However, learning development needs to be adapted to the unique characteristics and concepts of each subject. The world of education has been influenced by advances in technology and science, so efforts are made to adopt new technology in the learning process, such as utilizing media and multimedia. (Budiman, 2017)

One important element in successful learning is learning media. The use and selection of learning media are very important to improve the learning process and convey information and material more effectively to students. In addition, learning media can help students summarize information briefly and interestingly, making learning data easier to understand and increasing their understanding. (Arsyad, 2014).

Physical Education, Sports, and Health (PJOK) subjects are a series of holistic educational processes in learning that pivot on physical activity and healthy lifestyle

habits, thereby encouraging harmonious and balanced physical, mental, social, and emotional development. Physical education is education from, through, and in movement, physical activity, and sports to grow and develop the potential of students and individuals as a whole, including affective, cognitive, psychomotor, and social aspects (Shen and Sun, 2017).

According to Shen and Sun (2017), physical education is education from, through, and in movement, physical activity, and sports to grow and develop the potential of students or individuals as a whole, including affective, cognitive, psychomotor, and social aspects. According to Bucher in his (1972) book Foundation of Physical Education, "Physical education is an integrated part of a comprehensive educational process. The areas and targets pursued are physical, mental, emotional, and social development for a healthy country through the medium of physical activities.

Bayo et al. (2021) Implementation of good, effective, efficient, varied, and fun PJOK learning is the main requirement for a PJOK teacher in order to achieve quality PJOK learning, starting from the process to the results in terms of student learning activities and learning outcomes. The content of the scope of PJOK learning material at the junior high school level is as stated in Minister of Education and Culture Regulation Number 21 of 2016 concerning Content Standards for Primary and Secondary Education, one of which is physical activity and various basic movements of big ball games such as football, volleyball, and basketball, which are first content competency material at all levels of education.

Vivi (2024) Volleyball is a game played as a team, where each team consists of six people. Volleyball is a game that is popular among various groups, such as teenagers. This volleyball game is not only about the game; learning about volleyball requires theory and practice. This started in 1985, when the physical education coach at the YMCA (Young Men's Christian Association) in the city of Holyoke, Massachusetts, United States, created a game that we call volleyball. William G. Morgan, as the creator of the game of volleyball, initially gave the game the name "Minonette," with the aim of developing fitness and physical fitness for workers in addition to doing mass gymnastics.

According to Ahmadi (2007: 1), volleyball is "a complex game that is not easy for everyone to play because in the game of volleyball, movement coordination is needed that can really be relied on to carry out all the movements in the game of volleyball." Furthermore, Atmasubrata (2012: 50) explains that volleyball is "a sport game played by two opposing groups. "Each group has six players, and there is also a variation of the beach volleyball game where each group only has two players." Volleyball Game Techniques.

In the sport of volleyball, there are several basic techniques that can be learned, including serving, passing, smashing, and blocking." Each of these basic techniques has a different function. Beutelstahl (2011: 8) explains that techniques are "procedures that have been developed based on practice and aim to find the most economical and useful solution." Furthermore, Ahmadi (2007: 9) stated, "Techniques in volleyball games consist of serving, lower passing and upper passing, blocks, and smashes." The basic techniques contained in the game of volleyball greatly influence a person's skills in the game.

Wiliam had the idea that the game could be competitive, so the name of the game became "volley ball." Volleyball is a sport that requires teamwork that is very compact in maintaining a strategy to produce attacks and get points for the team. In volleyball, there are basic techniques that every player must master, namely the techniques of lower passing, upper passing, upper serve, lower serve, smash, and block. If basic techniques

cannot be mastered well, players will have difficulty managing the game; therefore, well-structured training is needed.

According to Rusman (2013: 291), who said that web-based learning is a learning activity that utilizes website media that can be accessed via the internet network, Web-based learning, also known as "web-based learning," is one type of application of electronic learning (e-learning). By learning using the web, students using learning models during the teaching process can generate new desires to motivate and stimulate learning (Mursid, 2018).

Web-based learning emphasizes that students do not only depend on the teacher in the learning process; they can also learn if the teacher is not present. Students can also repeat their lessons independently anywhere and at any time. This is in line with the opinion of Rusman (2013: 288), which states that students are independent at certain times and are responsible for their learning. The e-learning atmosphere will force students to play a more active role in their learning. Students make plans and search for materials with their own efforts and initiative. Mursid, et al. (2023) stated that the e-learning-based collaborative development model activates the learning process and is interesting and meaningful in the implementation of learning, carried out actively and enthusiastically trying to achieve the desired learning objectives, delivered in various learning modalities (multisensory), both audio, visual, and kinesthetic, to train higher-order thinking skills (such as problem solving, decision-making, etc.) and also indirectly improve ICT and media literacy skills.

Current technological developments are developing very quickly, especially web-based. Prawiradilaga (2016: 15) states that the development of information technology is moving so fast that it has penetrated all sectors of life. In fact, its development is estimated to be faster than previously thought, such as the development of web-based computers and cell phones. Previously, it was still very rare, but now it is open to certain people, from the upper strata of society to the lower strata of society, who cannot be separated from this technology.

The results of initial observations carried out using the interview method with teachers at Binjai 15 Integrated Islamic State Middle School show that the current learning media still uses textbooks and does not use technological media. Learning media should pay attention to students' needs and characteristics, because not all students can understand lesson material that only comes from textbooks. Binjai 15 Integrated Islamic State Middle School has adequate school facilities to develop web-based learning media. The problems faced by PJOK teachers in implementing the teaching and learning process at Binjai 15 Integrated Islamic State Middle School are due to the teacher's lack of knowledge of using interactive learning media. So in teaching, teachers still use learning media that are less interesting, resulting in low student learning outcomes.

Website-based learning, or the online learning process, is basically carried out using the internet or intranet network, so it is often called e-learning. One form of media that can support the implementation of the e-learning process is website-based learning multimedia, which contains various applications and learning materials that are connected online to the internet and is equipped with various other facilities that facilitate interaction between students, users, and teachers (Prasoja, 2011: 207).

Rusman (2013: 335) states that website-based learning, popularly known as Web-Based Education (WBE), sometimes called e-learning (electronic learning), can be defined as the application of website technology in the world of learning for an educational process. In simple terms, it can be said that all learning is carried out using internet technology, and as long as the learning process is felt by those who participate, the activity can be called website-based learning.

According to Clark & Mayer (2008: 10), web/e-learning has characteristics, including: (1) having content that is relevant to the learning objectives; (2) using instructional methods, for example, presenting examples and exercises to improve learning; (3) using media elements such as words and images to convey learning material; (4) allowing direct teacher-centered learning (synchronous learning) or is designed for independent learning (asynchronous e-learning); (5) developing understanding and skills related to learning objectives either individually or improving group learning performance.

Based on the description above, it is important to use web media teaching materials as a student learning resource that can be used to improve thinking skills by presenting real problems in everyday life, so that it is hoped that it can improve student learning outcomes in PJOK subjects. So researchers are interested in conducting research entitled "Development of Web Learning Media in the Class VIII PJOK Volleyball Subject at Integrated Islamic State Middle School 15 Binjai.".

The formulation of the problem in this research includes: (1) What is the procedure for developing Web-based learning media in volleyball learning? (2) How is the web-based learning media developed for volleyball subjects suitable for use by class VIII students at Binjai 15 Integrated Islamic State Middle School? (3) How can the web-based learning media for volleyball subjects that have been developed be effectively used by class VIII students at SMP Negeri Islam Terpadu 15 Binjai?

RESEARCH METHODS

This type of research uses research and development methods (Research and Development). According to Borg & Gall (2005: 589), the development research model carried out in this research utilizes the ADDIE development model. ADDIE consists of five stages, which include analysis, design, development, implementation, and evaluation, starting with research results, which are then used to design new products that are systematically tested, evaluated, and improved until they are effective for implementation. The main aim of development research is not to formulate or test a theory but to develop products that are effective and can be used in the learning process.

This research was conducted at the Binjai 15 Integrated Islamic State Junior High School on Jalan Paya Roba, Binjai City, North Sumatra. The subjects in this research were students in class VIII of Binjai Integrated Islamic State 15 Middle School for the 2023–2024 academic year. The object of this research is web development in the PJOK volleyball subject. The selection of this research object was based on the lack of variety in learning media in the class VIII PJOK Volleyball subject at Binjai Integrated Islamic State Junior High School 15. The web development that was developed contains material and evaluations that are tailored to student needs and the competencies that students must master.

The questionnaire sheet used in this research is a questionnaire sheet adopted from the multimedia learning assessment prepared by Sriadhi (2018). The grid of the questionnaire sheet for each instrument can be seen in Table 1 below:

Table 1. Research Instrument Grid for Learning Material Experts

No	Indicator	Assessment Aspects
1.	Guide and Information	Description of multimedia products
		Guide to using Media Software
		Formulation of goals
		Competency Formulation
2.	Multimedia Material	Conformity of objectives with the curriculum
		Suitability of material to purpose

		Up-to-date material
		Description of a concept or theory
		Order of presentation of material
		Suitability of material coverage with objectives
		Suitability of the depth of the material to the objectives
		Suitability of examples or illustrations to the material
		Kesesuaian contoh atau ilustrasi dengan materi
		Providing a summary
		Use of spelling and presentation grammar
3.	Evaluation	Instructions for covering questions with objectives
		Suitability of question coverage to objectives
		Suitability of the question domain to the objectives
		Suitability of the difficulty level of the questions to the objectives
		Distribution of question items based on question domain
		Distribution of questions based on level of difficulty
		Appropriateness of exam questions to time is provided
		Return (review) the results of practice or exams

Table 2. Research Instrument Grid for Learning Media Experts

No	Indicator	Assessment Aspects
1.	Guide and Information	Description of the media
		Media usage guide
		Assistance facilities
2.	Program Performance	Ease of installation and configuration
		Ease of use of navigation buttons (usability)
		Search accuracy and links (hyperlinks) of material
		Interface quality
		Consistency of program operational quality
		Program operational reliability from error free
		Operating system (software) support is required
		Hardware support required
		User stimulus-responsive interactivity with the system
3.	Systematics, Aesthetics, and Design Principles	
	Systematics	Systematics of screen media displays
		Menu facilities in media
		Acceleration of letters, numbers and symbols
	Aesthetics	The visual quality (resolution) of a graph or image.
		Color composition and resolution on the screen
		Match the color of the text to the background
		Acceleration of text, visuals, audio and animation
	Narration and Audio Quality	Narrator audio quality
		Use of language in narrative
		Suitability of background to material
	Video and Animation Quality	Use of video/animation resolution (pixels)
		Suitability of objects/videos/animations with the material

Table 3. Research Instrument Grid for Learning Design Experts

No	Indicator	Assessment Aspects
1.	Information Design	Providing instructions for use
		Clarity of material description
		Clarity of examples/illustrations provided
		Maximizing the learning process
		Use of text, images and videos

No	Indicator	Assessment Aspects
		Selection of font type and size
		Image quality
		Ease of use
		Enables students to learn independently
2.	Learning Design	Conformity of indicator formulation with basic competencies
		Suitability and clarity of the formulation of learning objectives with the formulation of indicators and basic competencies
		Suitability of material with competencies, KD, and indicators
		Suitability of material coverage with learning coverage
		Learning objectives Availability of practice/evaluation questions
		Consistency of tests with learning indicators
		Analyze the problem solving process
		Suitability of learning methods
		Prioritize independent learning
		Suitability of assessment methods (theory/practice)
		Utilization of varied learning resources (text/audio/video).
		Utilization of varied sources of knowledge, not from just one source

Table 4. Research Instrument Grid for Users

No	Indicator	Assessment Aspects
1.	Guide and Information	Description of the media
		The Multimedia usage guide is easy to understand
		The formulation of objectives is very clear
		Guidance for asking for help is well provided
2.	Multimedia Material	The material is appropriate to the topic of discussion
		The material supports the achievement of learning objectives
		The material is appropriate to the thinking abilities of students (users)
		The material is in accordance with current developments in science and technology
		Materi menjelaskan konsep atau teori sesuai tujuan pembelajaran
		The presentation of the material is arranged sequentially (hierarchical)
		The breadth of material coverage is in accordance with the learning objectives
		Providing examples or illustrations that are easy to understand
		The material summary includes all the material presented
		The duration of use depends on the material
		Spelling and grammar are easy to understand
		Writing material arranged in an orderly manner (systematic)
3.	Evaluation	The media provides instructions for doing it Practice/exam
		Practice/exam questions support the achievement of learning objectives
		The exam time is according to the number and level of difficulty of the questions
		Question items vary according to learning objectives
		Exam results are reviewed or fed back in the media
4.	Media Design and Facilities	Learning media is easy to use
		Command buttons have accurate links (Hyperlinks)
		Learning media can be run without damage
		Media provides interactive facilities for users
		Letters, numbers and symbols on digital media clearly
		The visual images (graphics) on the media are very good
		The coloring of the media content is very good
5.	Pedagogical Effects	This media provides what students need
		Students are interested in using this media to learn

No	Indicator	Assessment Aspects
		This media makes students more enthusiastic/active in studying
		This media helps to understand the material Learning
		This media helps improve abilities Learners

The tests used in this research use learning theory based on Anderson & Krathwohl's Taxonomy (2001), namely C1 (Remembering), C2 (Understanding/Understanding), C3 (Applying), C4 (Analyzing), C5 (Evaluating), and C6 (Creating)

Table 5. PJOK Learning Outcome Test Instrument Grid

Basic competencies	
4.1 Concept Variations and combination of skills in various big ball games with good coordination.	
No	**Test Question**
1.	What is the name of the basic technique in volleyball that involves receiving the ball from the opponent's serve?
2.	Why is correct body posture so important when making a down pass?
3.	In a game situation, how can a player apply the down passing technique well?
4.	How would you design a drill that would allow volleyball players to improve their down-passing technique
5.	When serving an opponent, how can a player apply the down passing technique effectively?
6.	What part of the body is generally used to make a down pass?
7.	In what situations would a player use a down pass?
8.	What is the difference between underpassing and overpassing in the context of a player's duties on the field
9.	Explain what creative ideas you can implement to involve the whole team in training on down passing techniques?
10.	Why is the libero often the player involved in the lower passing technique?
11.	A player receives a hard serve from an opponent. How can he apply the bottom passing technique well in this situation?
12.	Analyze the main role of down passes in shaping a volleyball attack. How can this technique impact the team's overall strategy?
13.	Analyze how variables such as serve speed, ball height, and serve angle can affect the quality of serve reception with the down passing technique. How can players adjust to these variables?
14.	Analyze one common mistake that often occurs in down passing techniques and provide solutions or suggestions for overcoming this mistake.
15.	What can you design to involve players in creating new variations in down-passing techniques during practice sessions?
16.	What is the main purpose of the down passing technique in volleyball?
17.	Analyze the differences between serving reception and lower passing techniques by experienced players and beginners. What differentiates their service reception?
18.	Analyze the impact of inappropriate body position when passing down on the accuracy and quality of service reception. How can players improve their body position to overcome these problems?
19.	What are the impacts if a player does not master the bottom passing technique well?
20.	How can you encourage players to create new methods of dealing with pressure in real game situations using down passes?
21.	What is the main purpose of the bottom passing technique in volleyball?
22.	A player stands too far from the opponent's service line when receiving a serve. How can the player improve his positioning to implement an effective down-passing technique?
23.	Analyze how the field situation, such as the size of the field and the condition of the field surface, can influence the implementation of down passing techniques. How can players adapt their technique to different court conditions?
24.	What is the maximum number of touches allowed for a down pass?
25.	Why do players need to involve fast and precise foot movements when making a down pass?

Feasibility Test Data Analysis Techniques

Input obtained from the results of multimedia assessments by experts is then analyzed using the following formula (Sriadhi, 2018).

a. Tabulate the answer scores for each instrument item in each aspect.
b. Find the average answer score for each aspect using the formula:

$$\bar{x} = \frac{\sum X}{n}$$

Information:

$\bar{x}$: Average score
$\sum X$: Total score of statement items
n : Number of data (number of statement items)

c. To assess the suitability of the media as a whole, this is done by involving all item scores in the three assessment aspects and calculating the average value using the formula:

$$\bar{x}_t = \frac{\sum X_i}{N}$$

Information:

$\bar{x}_t$: Average score
$\sum X_i$: Total score from the three assessment aspects
N : Total data for the three assessment aspects

To determine feasibility, the results obtained from this calculation are interpreted as in Table 6 below:

Table 6. Interpretation of the Feasibility of Learning Media

No	Interval Mean Score	Interpretation
1	1,00 – 2,49	Not worth it
2	2,50 – 3,32	Not suitable
3	3.33 – 4,16	Decent
4	4,17 – 5,00	Very decent

Source: Sriadhi (2018)

Expert validity questionnaire data was analyzed using the percentage score of the learning media developed. The formula used to calculate the percentage of expert validation questionnaires according to Sugiyono (2013) is:

$P = \frac{f}{N}$ x 100%

P = Score percentage (rounded)
f = Total score obtained
N = Maximum number of scores

Table 7. Product Validity Criteria

Percentage (%)	Validity Level	Information
81.00-100.00	Very Worth It	Can be used without revision
61.00-80.00	Worth it	Can be used with minor revisions
41.00-60.00	Not Appropriate	It is recommended not to use it
21.00-40.00	Not Eligible	Invalid due to major revision
00.00-20.00	Not Very Feasible	It is recommended not to use it

Source: Sugiyono (2013)

Effectiveness Test Data Analysis Techniques

Data collection techniques using post-tests in control and experimental classes were carried out to determine the effectiveness of Smart Apps Creator-based teaching and multimedia modules with the results of the Recount Text material test on students. Next, the data generated from the test will be tested for effectiveness.

Before carrying out an effectiveness test with the t-test, there are requirements that must be met, namely carrying out a normality test and a homogeneity test. The normality test aims to determine whether a respondent's data has a normal distribution or not. Meanwhile, the homogeneity test is used to test whether the variances of two or more distributions are the same or not. After both are fulfilled, the independent sample t-test can be carried out on the research data.

Average value

The following formula is used to obtain the average value for Sugiyono (2013)

$$\overline{x} = \frac{\sum X_i}{n}$$

$\overline{x}$: Mean (Average)
$\sum X_i$: the number of x values from I to n
n : Number of individuals

Standard deviation (Standard Deviation)

$$s = \sqrt{\frac{\sum(X_i - \overline{X})^2}{(n-1)}}$$

Information:
s : sample standard deviation
X_i : value of x 1 to n
$\bar{x}$: average
$(n-1)$: degrees of freedom
n : Number of samples

The normality test is carried out to determine whether the research data is normally distributed or not. This means that the distribution of data in the population is normal or not. Testing the normality of this data uses the Chi Square formula as follows:

$$x^2 = \sum\left(\frac{(F_0 - F_h)^2}{F_h}\right)$$

Information:
x^2 = Chi Square
F_0 = Frequency obtained from the sample
F_h = Expected frequency of the sample

According to Arikunto (2014), the Chi Square value used is with a significance level of 5% and degrees of freedom equal to the number of frequency classes -1 (dk=K-1). If x^2 count ≤ x^2 table, then it can be concluded that the data is normally distributed.

The homogeneity test is carried out to determine whether the distribution of data in the population is homogeneous. According to Sudjana (2005:249), the homogeneity of variance test can be calculated using the Barlett test, namely:

$$F = \frac{s_1^2}{s_2^2}$$

Hypothesis test

The research hypothesis needs to be tested for truth, in this research the statistical technique used to test the hypothesis is the t-test (independent test). The requirements that must be met in t-test data analysis are the presence of post-test results in the sample group. The hypothesis of the effectiveness test that will be tested is as follows:

Ho : $\mu_1 \leq \mu_2$
Ha : $\mu_1 > \mu_2$

Information:

μ_1 : average student learning outcomes using web-based learning media
μ_2 : average student learning outcomes without using web-based learning media
Ha : There is a significant difference in learning outcomes between classes that study using web-based learning media and classes that study without using web-based learning media
H0 : There is no significant difference between learning outcomes between classes that study using web-based learning media and classes that study without using web-based learning media

To test the hypothesis, the two-party test formula is used:

$$t_{count} = \frac{\bar{x}_1 - \bar{x}_2}{S\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

where S is the root of the combined variance calculated by the formula:

$S^2 = \frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1 + n_2 - 2}$ where $S = \sqrt{s^2}$

Information:

$\bar{x}_1$: average experimental class score
$\bar{x}_2$: average control class score
n_1 : number of experimental class samples
n_2 : number of control class samples
S_1^2 : variance in the experimental class
S_2^2 : variance in the control class
S : combined variance
t : calculation price

with db = n1 + n2 – 2

The correlation criteria obtained are said to be significant (the hypothesis is accepted) if the t_count > t_table for a significance level of 5%. The effectiveness value of web-based learning media is obtained based on the percentage of classical completeness, which is then categorized based on a minimum learning completeness standard of 75 in PJOK subjects where the effectiveness criteria are met if students achieve completeness greater than or equal to 75%.

RESULTS AND DISCUSSION

Results

Web display product results and collection of materials needed for product development according to predetermined basic competencies in the form of main material and other supporting aspects such as text, images, animation, audio and video. Basic display/Dashboard from the blackampus.my.id website which contains various learning

information, especially learning. Menu and SubMenu displays consisting of various PJOK Subjects starting from Big Ball Games (Volleyball, football and basketball).

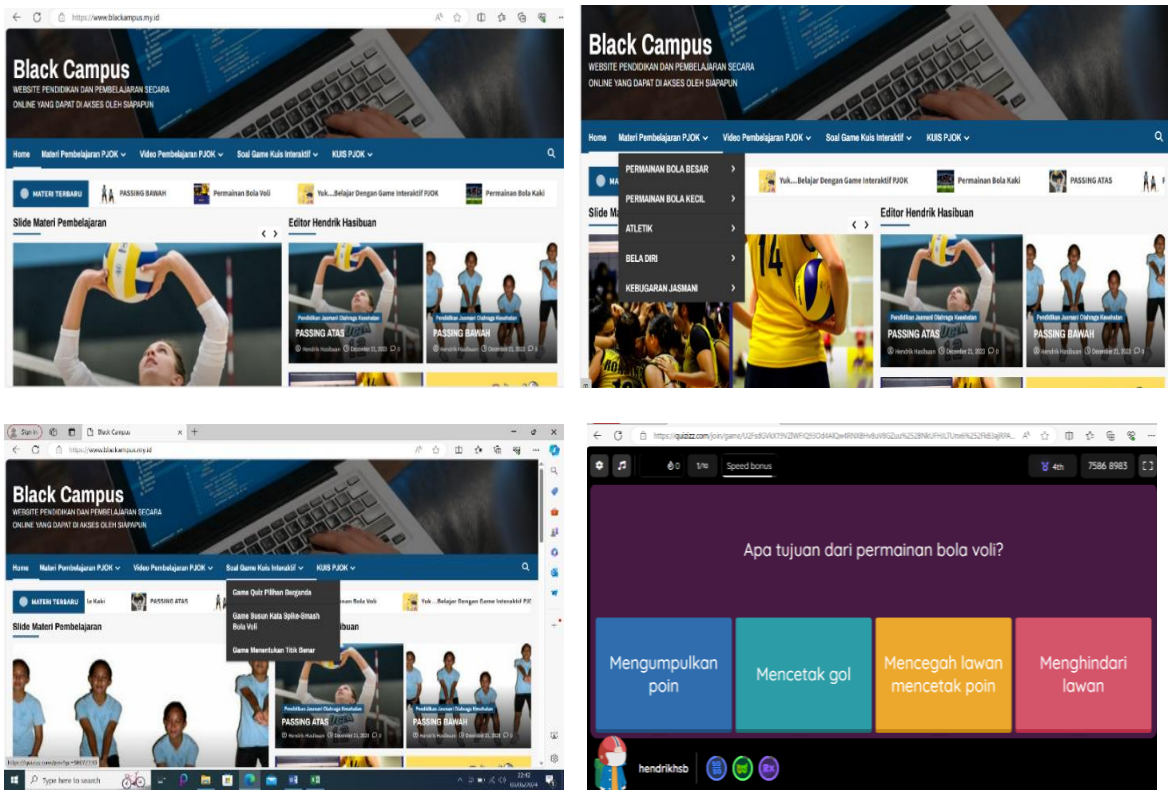

Figure 1. Basic Display / Dashboard of the blackampus.my.id website which contains various learning information, especially learning, Menu and SubMenu displays consisting of various PJOK Subjects starting from Big Ball Games (Volleyball, football and basketball) , and the Tolbar Menu Display is also a menu that will be hyperlinked to Quizziz

The results of the validation of learning media were carried out by media experts on web-based learning media. Learning media experts carry out product validation in aspects of appearance, appropriateness of content, presentation and graphics. The validation results in the form of assessment scores for web-based media components in PJOK subjects can be seen in table 8.

Table 8. Average Score for Web-based Media Assessment by Learning Media Experts

No	Assessment indicators	Score	Percentage
1	Alloys and information	4,6	92%
2	Programming	4,2	84%
3	Systematics	4	80%
4	Aesthetics	4,7	94%
5	Narrative and video quality	4,7	94%
6	Video / animation quality	4,5	90%
	Mean score	**4,45**	**89%**
	Interpretation	**Very worthy**	

The results of the learning design validation were carried out by design experts on web-

based learning media. Learning design experts carry out product validation on the appropriateness aspects of content and graphics in accordance with the process and stages of instructional development. The validation results in the form of assessment scores for web-based learning media components in PJOK subjects can be seen in table 9.

Table 9. Web-based Media Assessment Scores by Learning Design Experts

Assessment indicators	Score	Percentage
Information Design	4,6	92%
Learning Design	4,6	92%
Mean score	**4,6**	**92%**
Interpretation	**Very worthy**	

The results of the learning material validation were carried out by material experts on web-based learning media. Learning material experts carry out product validation on the material, learning process and linguistic aspects. The validation results in the form of assessment scores for web-based learning media components in PJOK subjects can be seen in table 10.

Table 10. Web-based Media Assessment Scores by Material Experts

Assessment indicators	Score	Percentage
Guide and Information	4,7	94%
Multimedia Material	4,4	88%
Evaluation	4,5	90%
Mean score	4,5	90%
Interpretation	**Very worthy**	

The average percentage of expert assessment results for learning media, learning design and learning materials can be seen in table 11.

Table 11. Average Percentage of Eligibility Results from Expert Assessment

No	Category Assessment	Interval Mean Score	Percentage	Interpretation
1	Validation of Learning Media	4,45	89%	Very Eligible
2	Validation of Learning Design	4,6	92%	Very Eligible
3	Validation of Learning Materials	4,5	90%	Very Eligible
Average		**4,5**	**90%**	**Very Eligible**

Table 12. Acceptance Scores for Web-Based Learning Media by Students in Individual Trials

No	Assessment indicators	Score	Percentage
1	Guide and Information	4	80%
2	Multimedia Material	4,5	90%
3	Evaluation	4,1	82%
4	Media Design and Facilities	4,6	92%
5	Pedagogical Effects	4,4	88%
Mean Score		**4,3**	**86%**
Score		**Appropriate Acceptance**	

Table 13. Acceptance Scores for Web-Based Learning Media by Students in Student Group Trials

No	Assessment indicators	Score	Percentage
1	Guide and Information	4,6	92%
2	Multimedia Material	4,5	90%
3	Evaluation	4,5	90%
4	Media Design and Facilities	4.5	90%
5	Pedagogical Effects	4,4	88%
Mean Score		4,5	90%
Score		**Appropriate Acceptance**	

The average percentage of assessment aspects from student assessment results in individual trials and student groups can be seen in table 14 below.

Table 14. Average Percentage of Trial Results by Students

No.	Assessment Category	Interval Mean Score	Percentage	Interpretation
1	Student (Individual)	4,3	86%	Acceptance Very Decent
2	Students (Student Group)	4,5	90%	Acceptance Very Decent
Average		**4,4**	**88%**	**Acceptance Very Decent**

Table 15. Frequency Distribution of Student Learning Outcomes Using Web-Based Learning Media

No	Interval Class	Frequency	Relative Frequency (%)
1	72-76	6	24%
2	77-81	3	12%
3	82-86	4	16%
4	87-91	4	16%
5	92-96	8	32%
6	97-100	0	0%
Total		**25**	**100%**

Table 16. Frequency Distribution of Student Learning Outcomes Without Using Web-Based Learning Media

No	Interval Class	Frequency	Relative Frequency (%)
1	64-69	7	28%
2	70-75	2	8%
3	76-81	9	36%
4	82-87	3	12%
5	88-93	4	16%
6	94-99	0	0%
Total		25	100%

The results of the calculation of the data normality test in the control class obtained Lcount = 0.123 and Ltable at the 5% significance level with n = 25 was 0.173. This shows the value of Lcount < Ltable, which means the sample comes from a population with a normal distribution. A summary of the results of the data normality test on the two research samples can be seen in table 17 below.

Table 17. Summary of Data Normality Test Results

No	Class	Lcount	Ltable	Conclusion
1	Experiment	0,108	0,173	Normal
2	Controls	0,123	0,173	Normal

Based on the results of the data normality test in the two classes or samples, it can be concluded that the two groups of sample data are normally distributed.
A summary of the results of the data homogeneity test on the two research samples can be seen in table 18 below.

Table 18. Summary of Data Homogeneity Test Results

No	Class	Fcount	Ftable	Conclusion
1	Experiment	0,778	1,96	Homogeneous
2	Controls			

In table 18 above, it can be seen that Fcount < Ftable, namely 0.78 <1.96, which means that the data in the research sample has the same or homogeneous variance.

From the calculation results in the Appendix, tcount = 3.225 and the ttable value at the 5% significance level is 1.6772, which means tcount > ttable (3.225>1.677, which means Ho is rejected and H_1 is accepted. Thus the research hypothesis states that students' PJOK learning outcomes using learning media web-based learning is higher than students who study (without using web-based learning media) which is proven to be true.

The effectiveness value of web-based learning media is obtained based on the percentage of classical completeness which is then categorized based on a minimum learning completeness standard of 75 in PJOK subjects where the effectiveness criteria are met if students achieve completeness greater than or equal to 75%.

The formula for calculating the classical completion percentage is as follows:

$$X = \frac{number\ of\ students\ who\ completed}{Number\ of\ All\ Students} \text{ x } 100\%$$

$$X = \frac{23}{25} \text{ x } 100\% = 88\ \%$$

The effectiveness value of web-based learning media is higher than the effectiveness value of learning without web-based learning media, namely 64%. So it can be concluded that the web-based learning media that has been developed is effective in improving learning outcomes in class VIII PJOK subjects at the Integrated Islamic State Middle School 15 Binjai.

Discussion

Web-based learning media development products for PJOK subjects in Lower Passing material are products developed by paying attention to aspects of learning and also learning principles starting from design, media, and the material or content therein. This development research aims to produce a product in the form of web-based learning media on the PJOK language subject on the topic of Lower Passing in order to improve the quality of the learning process and student learning outcomes, as well as the competence of teachers and students in utilizing technology and information in this technological era.

Endriani et al. (2022). Developing a model by passing under volleyball based on the umbrella learning approach has a significant influence on students' abilities in learning PJOK.

The web-based learning media developed was declared feasible after passing the validation process. The validation used in development research is the validation of media experts, design experts, and material experts. Learning media experts validate products in terms of appearance, appropriateness of content, presentation, and graphics. Learning design experts carry out product validation on the appropriateness of aspects of content and graphics in accordance with the process and stages of instructional development.

Rahman (2021), in his research, concluded that the web-based learning media developed was suitable for use. This is reinforced by validation results by material experts, media experts, and design experts, which show very valid results. Besides that, Joko and Wulandari (2018), in their research, showed that media developed using the web is suitable for use. The development of this media has gone through a validation process that includes indicators, objectives, material selection, learning resource selection, learning media selection, learning models, learning scenarios, assessments, and literature. Meanwhile, aspects of lesson material that are validated include layout, illustrations, material content, language, and literature.

The results of this research are in line with research conducted by Thesalonika (2019), which states that the web-based learning developed is suitable for use. This is reinforced by the results of validation carried out on media experts, design experts, and material experts.

From the results of the development of the feasibility test for web-based learning media, which has gone through the feasibility test stage with experts, the results show that web-based learning media is very suitable for use, where the average percentage of feasibility test results for web-based learning media is 90%, as well as the percentage of student trials by 88%. Based on the results of validation and trials that have been carried out, the development of web-based learning media is suitable for use in class VIII PJOK subjects at Binjai 15 Integrated Islamic State Middle School.

A learning media product is said to be effective after it is proven to be able to demonstrate good results in achieving predetermined learning goals. In this case, a product effectiveness trial was carried out in the learning process between teachers and students through learning outcomes after learning using the product developed.

From data processing on learning outcomes carried out on students who studied using web-based learning media in the class VIII PJOK subject, an average of 84.96 was obtained. Meanwhile, the PJOK learning outcomes without using web-based learning media were 77.12. The percentage of classical completeness based on minimum learning completeness and the effectiveness criteria for the experimental class pattern was 88%, and in the control class it was 64%, indicating that the media product developed was effective in improving students' PJOK learning outcomes. because the complete learning outcomes of students who use the web-based learning media products that have been developed have met the effectiveness criteria of ≥ 75% and are also higher than those of students who do not use the web-based learning media.

The results of this research are in line with research conducted by Qaddumi (2021), which stated that there were significant differences in the mastery and retention of skills among students in the experimental group. Likewise, research by Cao and Liu (2019) concluded that the web-based mixed PJOK learning mode had a significant learning effect. The results of this research are in line with research conducted by Joko (2020), who

showed that the media developed using the web learning management system has been effective.

So it can be concluded that the web-based learning media that has been developed is effective in improving learning outcomes in class VIII PJOK subjects at the Integrated Islamic State Middle School 16 Binjai.

CONCLUSION

Based on the results of the analysis and discussion described in the previous chapter, several things can be concluded, as follows:

1. The web-based learning media that has been developed is suitable for use in PJOK subjects, because the development of this learning media has gone through several stages. One of the stages of developing web-based learning media is the validation of results from learning design experts, media experts, and material experts to provide input and correct deficiencies in the learning media being developed, as well as having passed the feasibility test stage for the media being developed. The final assessment results from the experts are in a very worthy category.
2. The web-based learning media developed is effective for use in PJOK subjects. This can be seen from the achievement of learning objectives, which can be strengthened by the results of effectiveness tests or student learning outcomes, where there are differences in the learning outcomes of students who use web-based learning media and learning carried out conventionally.

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