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Development Of Interactive Multimedia In Social Studies Learning To Improve Students' Digital Literacy Skills At SMP Negeri 17 Tulang Bawang Barat

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Abstract: This research and development (R&D) study aimed to create an Android-based interactive learning multimedia to improve digital literacy skills at the junior high school level, specifically within Social Studies learning at SMP Negeri 17 Tulang Bawang Barat. The methodology for this study adhered to the ADDIE model, which systematically guides the process through five distinct stages: Analysis, Design, Development, Implementation, and Evaluation. The process involved validating the product with experts before testing it with users. The validity and effectiveness were measured using a questionnaire with a Likert scale, analyzed through both qualitative and quantitative methods, including inferential statistical tests. The multimedia was deemed highly valid based on evaluations by media and content experts, with scores of 86.45% and 85.66%, respectively. It was also rated as attractive by teachers and students, with a percentage of 88.83%. Additionally, it was found to be effective, with an N-Gain of 0.73 (high category) and an average digital literacy improvement of 17.01%. The results of this research present an engaging and effective learning media that helps enhance students' understanding of Social Studies through the development of digital literacy.

Keywords: Interactive Multimedia, Multimedia Development, Digital Literacy

I. INTRODUCTION

Education has a significant impact on various aspects of human life, making it crucial for preparing for the future (Makkawaru, 2019). Without education, people lack knowledge, are more prone to crime, and have less experience. Conversely, those who are educated are more likely to lead stable and meaningful lives. The caliber of a country's human capital is a fundamental determinant of its developmental progress (H. Son, 2010). A quality education system is a key prerequisite for producing superior human resources (Pujiati, 2016).

The use of appropriate media in the classroom by educators can serve as a catalyst for students to reach their academic goals (Haokip, 2025). This is in line with the opinion of Pujiati et al. (2022), who stated that instructional media design that involves active student participation can build conceptual understanding and develop critical thinking, problem-solving, and communication skills. The choice of suitable instructional media plays a vital role in enhancing the learning process, making it more effective, efficient, and conducive to a profound comprehension of the subject matter among students (Arsyad, 2017).

The generation born and raised in the digital age is exposed to a wide range of technologies, from smartphones to tablets (Nicole Aschoff, 2018). Their daily activities are also inseparable from the role of these various gadgets (Ani et al., 2020). The results of

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a questionnaire analysis of ninth-grade students at SMPN 17 Tulang Bawang Barat revealed that the majority of respondents use gadgets to access the internet for various purposes, such as surfing social media, searching for information, and playing games. However, observational data show that 64% of the total students use smartphones more for activities on social media platforms (Facebook, Instagram, TikTok). On the other hand, only 14% of students use them to search for learning materials. These findings indicate that the use of gadgets is not yet optimal in supporting the teaching and learning process. According to Santoso (2020), these devices have two sides to their impact; the positive side is that they facilitate the search for academic information, while the negative impact is the potential for laziness in learning due to uncontrolled addiction to online games.

Based on Ariani & Festiyed (2019), interactive multimedia learning is defined as a learning approach that utilizes media by combining various elements such as text, graphics, audio, video, and animation, equipped with user operation controls. This type of learning model is believed to increase student participation because it presents concepts through a combination of media that strengthens visual and in-depth understanding (Sadiman, 2019). Unfortunately, the reality in the field shows that many teachers still use media that is less interesting and does not motivate students, thus potentially causing boredom during the teaching and learning process (Ula et al., 2020).

Table 1. Types of Learning Media Used by Teachers at SMPN 17 Tulang Bawang Barat to Support Learning

Question	Answer	
	Type of Learning Media	**Percentage (%)**
What types of media do you often use to support learning activities in the classroom?	Books and Printed Materials	
	Teaching Aids and Models	8
	Audio Visual (PowerPoint)	16
	Interactive Multimedia	4

Source: 2025 Pre-Research Data

This is in line with the findings from observations and interviews with ninth-grade teachers at SMPN 17 Tulang Bawang Barat, which revealed the main problem, namely monotonous learning. Quantitative data reinforces these findings, with 72% of teachers still relying on textbooks as their primary medium. The use of audio-visual media such as PowerPoint only reached 16%, followed by teaching aids (8%), and only about 4% utilized interactive multimedia. The dominance of one-way lecture methods is also a characteristic of the learning process at this school.

In the era of globalization and the 4.0 industrial revolution, digital literacy has become one of the essential competencies that students must possess (Hadayani et al., 2020). Digital literacy is the ability to interpret and apply various forms of information from a variety of presentations (Rizal, 2021; Fatimah & Hidayati, 2023). The essence of literacy is not limited to the skill of reading literally, but more to a deep understanding of the substance of the reading. Gilster also emphasizes the dynamics of analytical thinking when interacting with digital platforms, where the evaluative ability of the content found is considered more essential than technical mastery in operating the media (P. Glister, 1997). The essence of digital literacy goes beyond mere proficiency in operating devices. Its scope is broader, encompassing various competencies such as the ability to search for and sort information, critical and creative thinking skills, effective collaboration and communication skills, as well as an understanding of digital security and its socio-cultural impact (Naufal, 2021). This view is in line with the model proposed by Renee Hobbs (2010), which details digital media literacy competencies into several key aspects: Access, Analysis & Evaluation, Creation, Reflection, and Action Previously, Gilster (1997) established a framework of four core competencies that constitute digital literacy, which are the ability to search the internet, navigate hypertext, evaluate content, and assemble knowledge.

On the other hand, a lack of digital literacy can have various negative impacts, such as the spread of hoaxes, cyberbullying, and unproductive content (Hayati & Aidin, 2025). The inability to sort and analyze digital information makes students vulnerable to the negative influences of social media (Meilinda et al., 2020). The results of preliminary observations conducted on February 10, 2025, in class IX of SMPN 17 Tulang Bawang Barat showed that digital literacy awareness and skills in the classroom tended to be low. Based on the observation data, 76% of students did not routinely use their digital devices for learning purposes, and 82% of students were not yet able to operate learning applications properly. Furthermore, the data above also shows that 87% of

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students did not check the authenticity of information before using it in assignments, and 68% of students rarely used their smartphones to create digital content. This reflects the students' low understanding of the importance of digital literacy skills for academic achievement.

To overcome these challenges, a breakthrough is needed in creating learning media that is in line with the nature of the subject matter. Media is needed that is capable of providing comprehensive explanations so that students can understand and master Social Studies (IPS) material without confusion, one of which is through Android-based interactive multimedia learning media. The importance of developing digital literacy-based interactive multimedia has also been approved by all social studies teachers at SMPN 17 Tulang Bawang Barat. Therefore, the application of a learning model with digital literacy-based interactive multimedia is proposed as an effective solution. The choice of interactive multimedia is based on its ability to present visual and audiovisual content, which can accommodate various student learning styles (Nurcahyo, 2020). This media is also flexible to be adjusted to the learning speed of each individual (Dong et al., 2024; Prabawa & Restami, 2020). According to Darmawan et al. (2017) and Fatimatul Aulia (2025), the strength of multimedia lies in the integration of various elements such as text, audio, graphics, and interactivity. Its dynamic and attractive nature makes it a popular choice to avoid boredom in learning (Kusmanagara et al., 2018).

The uniqueness of Digital Literacy-Based Interactive Multimedia lies in its ability to present contextual material that is relevant to the students' environment, particularly in social studies learning. This distinguishes it from conventional multimedia products. The presence of concrete examples in the Android platform not only facilitates understanding but also plays a significant role in motivating learning. This research is primarily aimed at creating a novel educational framework to address the deficiency in digital literacy skills among junior high school students in the ninth grade. The proposed method is the implementation of interactive learning media designed to increase learning engagement and focus. Ultimately, this study is expected to produce an Android-based interactive multimedia product specifically aimed at improving students' digital literacy competencies in accordance with standard indicators.

II. RESEARCH METHOD

The systematic strategies utilized in scientific inquiry to acquire data for targeted purposes and practical implementation are termed research methods (Sugiyono, 2015). The ultimate objective of the Research and Development (R&D) method is to generate a product and verify its usefulness, specifically for application in the realm of education (Maydiantoro, 2021). This research and development (R&D) method is a systematic approach designed to produce new products and evaluate their effectiveness. The development model used as a guide in this study is the ADDIE model, which has five stages of research: analysis, design, development, implementation, and evaluation.

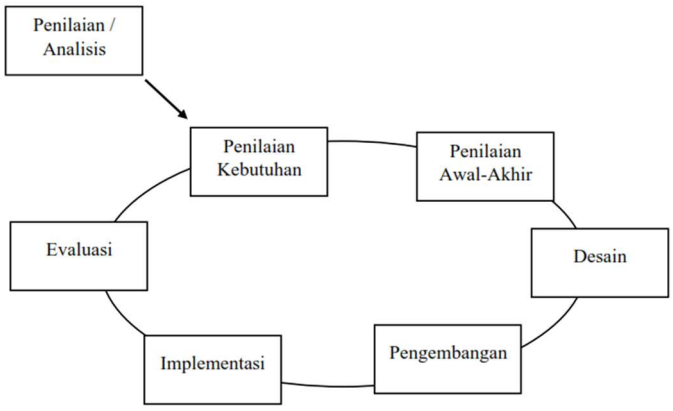

Figure 1. ADDIE Development Stages (Willian W. Lee and Diana L. Owens, 2004)

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This study follows the ADDIE model. In the analysis stage, researchers will identify students' learning needs, student characteristics, and learning materials to be delivered through interactive multimedia. Next, in the design stage, an attractive and effective display, interaction, and learning flow will be designed. The development stage will focus on creating interactive multimedia in accordance with the design that has been made. After that, the instructional media will be deployed within the classroom learning environment. Finally, the effectiveness of the learning media will be evaluated by measuring the digital literacy comprehension and learning outcomes of ninth-grade social studies students at SMPN 17 Tulang Bawang Barat.

This development research uses a mixed methods approach with qualitative and quantitative data. Qualitative data sources were obtained from expert evaluations, while quantitative data were collected from student response questionnaires. The main focus of this study is the design of Android-based interactive multimedia aimed at improving the digital literacy competencies of ninth-grade students at SMP Negeri 17 Tulang Bawang Barat. The context of the material used in this development is the subject of Social Studies (IPS).

The product development process must involve a validation stage by experts to ensure that the media produced meets learning objectives and can improve students' digital literacy. After meeting the eligibility standards, the product can then be tested by users. The evaluation instrument used is a questionnaire with a five-point Likert scale, each scored from 1 to 5. This scale is effective for measuring subjects' responses, including attitudes, perceptions, and qualitative assessments of the product. Data collection in this study used a rating scale instrument. This technique is essentially an assessment method that quantifies raw numerical data for subsequent interpretation into a descriptive evaluation. The main function of the rating scale in this context is to test the validity and practicality of the developed media. The preliminary stage in developing this instrument is the creation of an instrument grid. The goal is to ensure that the instrument is in line with the achievement indicators to be targeted.

In this study, the research instruments used were instruments for assessing media validity, media attractiveness, media effectiveness, and tests to measure students' digital literacy comprehension levels, which had been declared valid. This development study adopted three data analysis approaches, namely qualitative descriptive statistics, quantitative descriptive statistics, and inferential statistics in the form of a t-test. Qualitative data obtained from the results of expert evaluations (media experts, material experts, teachers, and students) were processed using qualitative descriptive statistical techniques. An inferential statistical analysis, specifically a t-test, was employed to assess the multimedia's efficacy in enhancing digital literacy by comparing the results from the pre- and post-tests. The data's normality and homogeneity, which are the fundamental prerequisites for a t-test, were examined before the test was carried out. The following are the formulas and assessment criteria according to Suharsimi Arikunto (2003):

1. Measuring Media Validity Levels

$$P = \frac{\sum x}{\sum xi} \times 100\%$$

Table 2. Validity Level Qualifications Based on Percentage

Percentage (%)	Validity Level	Eligibility Criteria
85-100%	Highly Valid	No revision needed
69-84%	Valid	No revision
53-68%	Sufficiently Valid	Partial revision
37-52%	Less Valid	Revision needed
21-36%	Highly invalid	Total revision

Source: Arikunto, 2003

Based on these criteria, a learning medium is considered valid if it scores between 69 and 100 on all items in the validation questionnaire, which includes media experts and subject matter experts. The developed media must achieve this level of validity. If it does not meet the validity criteria, revisions must be made until the media is declared valid.

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2. Measuring Media Attractiveness Levels

$$P = \frac{\sum x}{\sum xi} \times 100\%$$

Table 3. Validity Level Qualifications Based on Percentage

Score	Value	Attractiveness Criteria
5	91 – 100 %	Very Attractive
4	71 – 90 %	Attractive
3	61 – 70 %	Quite Attractive
2	51 – 60 %	Less Attractive
1	< 50 %	Not Attractive

Source: Arikunto, 2003

The more interesting the learning media is, the more it is expected to improve the digital literacy skills of ninth-grade students at SMPN 17 Tulang Bawang Barat. At this stage, to evaluate the media that has been created, a questionnaire can be used to gauge students' responses regarding the level of interest in the learning media.

3. Measuring Media Effectiveness

An experiment was carried out to evaluate the impact of the product on the learning process, employing a t-test and normalized N-Gain calculations to analyze the differences between pre- and post-implementation results. The difference in gain values was then analyzed statistically using a paired t-test with the following formula:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2} - 2r\left(\frac{S_1}{n_1}\right)\left(\frac{S_2}{n_2}\right)}}$$

The following decisions were made based on the N-Gain Score analysis:

Table 4. N-Gain Score Distribution

N-Gain Score	Category
g > 0,7	High
0,3 ≤ g ≤ 0,7	Moderate
> 7	Low

Source: Arikunto, 2003

Table 5. Categories of N-Gain Effectiveness Interpretations

Percentage (%)	Interpretation
< 40	Ineffective
40 – 55	Less Effective
56 – 75	Moderately Effective
> 76	Effective

Source: Arikunto, 2003

4. Measuring Digital Literacy Comprehension

$$\text{Percentage} = \frac{\sum \text{score for each item}}{\sum \text{maximum score}} \times 100\%$$

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Table 6. Calculating Student Digital Literacy Comprehension Questionnaire

Average score	Criteria
80% ≤ NR ≤ 100%	Very well understood
60% ≤ NR ≤ 79%	Understood
40% ≤ NR ≤ 59%	Fairly well understood
20% ≤ NR ≤ 39%	Not well understood
0% ≤ NR ≤ 20%	Not well understood at all

Source: Arikunto, 2003

To test the effectiveness of the product in changing students' digital literacy understanding, we can look at the average score in the data processing section of the student digital literacy understanding questionnaire. Based on the classification in Table 3.9 above, if the average score for digital literacy understanding is between 60% ≤ NR ≤ 79%, which means it falls under the "Understands" criterion, and 80% ≤ NR ≤ 100%, which means "Understands Very Well," then this media can be said to be effective in improving students' digital literacy skills. Conversely, if the average score for students' digital literacy understanding is <60%, then the media can be said to be less effective in improving students' digital literacy.

III. RESULT AND DISCUSSION

The results of developing interactive multimedia for social studies learning contain material about globalization and its impact on life. This multimedia can be operated on laptops/computers, but it can also be operated on Android devices on each student's gadget. They can access the link sent or install the final product in the form of an apk file on their devices. This makes it easier for students to use this multimedia anywhere and anytime without using internet quota.

The material presented in this multimedia is Grade IX social studies material, namely an introduction to the types of globalization and its positive and negative impacts on life. The developed application contains six main menus, including instructions, competencies (CP and TP), material on Globalization and Its Impact on Life, Quiz, Game, and developer profile. The interactive multimedia display that has been developed can be seen in Figures 2, 3, and 4.

Figure 2. Initial Menu

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Figure 3. Main Menu

Figure 4. Content Display

In the process of developing this multimedia, it has gone through three stages of media validation with a final validation result of 86.45% , which means it falls into the “highly valid” category so that the feasibility criteria do not need to be revised. Details of several revisions from media experts can be seen in Table 7.

Table 7. Media Expert Revision

No	Suggestions for Improvement	Revisions
1.	Create a login menu containing name, email, and password	Create the menu as suggested
2.	Select the appropriate font for the media display	Improve as suggested
3.	Add audio to the media page	Add appropriate audio
4.	Change the background on several material pages	Replace with a more attractive background
5.	Add games to enhance the media's distinctive features	Improve by creating a games page

Source: Research Result

The validation of the material by subject matter experts also went through three stages, with a score of 85.66%, which falls into the “highly valid” category. Improvements to the material can be seen in Table 8.

Table 8. Material Expert Revision

No	Suggestions for Improvement	Revisions
1.	Improve the writing of existing material in the media	Improve the writing according to suggestions
2.	Provide images for the material	Add several images to the material
3.	Provide material videos with a duration of 5-10 minutes	Add material videos according to suggestions

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4.	Provide several examples of globalization that are relevant to students' lives	Add several examples according to suggestions
5.	Revise several questions in accordance with CP and TP	Revise as suggested

Source: Research Result

The developed media was deemed appropriate for testing based on the results of the expert validation. After being validated by media and material experts, the developed media was tested on junior high school teachers and students, particularly social studies teachers and ninth grade students at SMPN 17 Tulang Bawang Barat. This test aimed to determine the level of attractiveness of the media before its eligibility was determined. Respondents were selected from two teachers and 30 ninth-grade students who had Android devices and had studied the material "Forms of Globalization and Their Impact on Life." Based on the questionnaire distributed to respondents, the results showed that 88.83 % found the media "interesting."

Furthermore, before entering the final trial stage, the effectiveness of this learning media needs to be tested so that it can later be applied in social studies learning activities to measure the improvement in students' digital literacy skills. To determine the effectiveness of the media, an experiment was conducted using a t-test and normalized N-Gain calculations to compare the results before and after students used this interactive multimedia. Based on the results of the assessment test conducted by the students, an N-Gain value of 0.73 was obtained, which means it falls into the "high" category, and the percentage of effectiveness interpretation is 78 %, which falls into the "effective" category.

In this study, the digital literacy that we want to develop is the ability of students to optimize computers or laptops as innovative technologies to manage various information obtained and distribute it to others. The assessment of digital literacy competencies for students at SMPN 17 Tulang Bawang Barat is integrated directly during the learning process. This is possible because in its implementation, the researcher, who also acts as a teacher, uses interactive multimedia-based learning media. This media is divided into two parts according to the teaching material, namely the forms of globalization and its impact on life. The use of interactive multimedia in learning not only improves conceptual understanding but also directly trains students' digital literacy skills, particularly in evaluating and utilizing information (Seppewali & Damma, 2023). To measure the improvement in students' digital literacy competencies, this study applied a number of analytical steps. The stages began with processing data sourced from assessment sheets containing 10 questions. The development of this instrument was guided by the key components of digital literacy assessment, which encompass the abilities to access, analyze, evaluate, produce, reflect upon, and act on digital information (Hobbs 2011, in Marty, et al., 2013). This method involved 30 students as samples, where the improvement in ability was seen from a comparison of the average total scores before and after using the interactive multimedia that had been developed in learning.

Data on improvements in digital literacy for each component is presented in detail in the following table.

Table 9. Data on Improvements in Digital Literacy Skills for Each Aspect

No.	Digital Literacy Aspects	Before	After
1.	Accessing	78,64 %	91,21 %
2.	Analyzing and Evaluating	67,71 %	88,05 %
3.	Creating	60,92 %	80,27 %
4.	Reflecting	65,79 %	85,13 %
5.	Action	70,36 %	83,78 %
	Average	**68,68%**	**85,69%**

Source: Research Result

Based on the table, it can be seen that there was an increase in all aspects of students' digital literacy after utilizing interactive multimedia in learning. This positive change is reflected in the average score difference of 17.01 % between the phases before and after the use of media. To facilitate the analysis of the development of each indicator, Figure 5 presents a bar chart that refers to Table 9, to show the increase in students' digital literacy.

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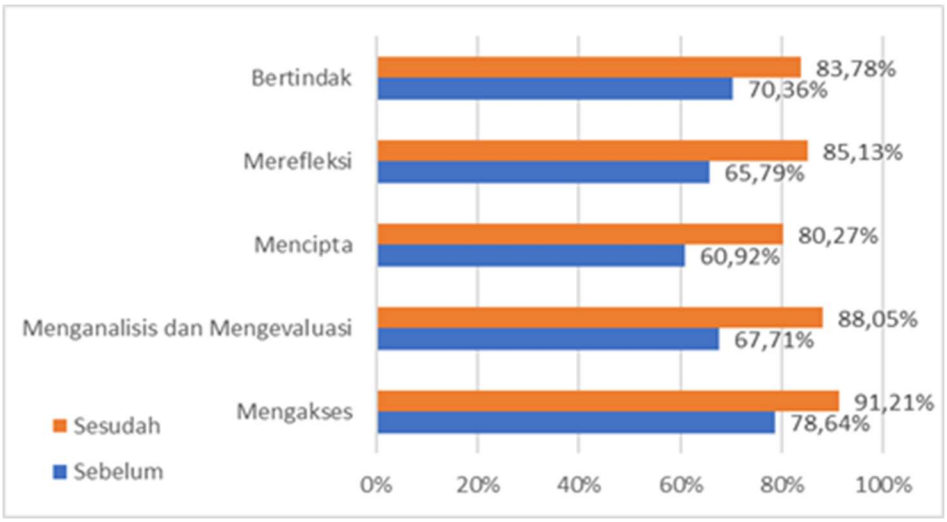

Graph 1. Improvement in Students' Digital Literacy Skills

Based on the bar chart visualization, it can be observed that there was a significant increase in all aspects of students' digital literacy after implementing interactive multimedia in learning. A comparison of the data before and after the treatment shows a significant jump in each indicator.

These findings confirm the effectiveness of the learning media used in improving students' digital literacy competencies. The details for each aspect will be described sequentially below.

1) Accessing

The aspect of accessing refers to an individual's ability to effectively search for, find, and obtain digital information. This ability is not limited to the technical operation of devices, but also includes the ability to navigate various digital platforms and credible sources of information. In this era of information overload, mastery of this aspect enables individuals to meet their information needs accurately and efficiently. In this study, there was an increase in students' access skills.

This may be due to the fact that each student is already accustomed to and experienced in using gadgets/smartphones effectively for learning and other activities. Based on the findings, the students sampled in this study already have the ability to access and use technological devices effectively. They can easily operate the devices and run interactive multimedia programs during the learning process using their gadgets. This aspect shows a significant increase of 12.57 %, from 78.64 % to 91.21 %.

2) Analyzing and Evaluating

This aspect is at the core of critical thinking in the digital space. Analyzing means the ability to break down information into parts, understand the relationships between those parts, and identify patterns, biases, or hidden meanings in a piece of content. Meanwhile, evaluating is the ability to assess the credibility, accuracy, relevance, and reliability of information based on its source and context.

The ability to analyze and evaluate information is a crucial pillar of digital literacy. This aspect tests the depth of students' understanding in digesting material. Research shows that there was a significant increase in students' analytical and evaluative competencies after the implementation of interactive multimedia, with an increase of 20.34 % from 67.71 % to 88.05%. This phenomenon is strongly suspected to be triggered by variations in the intelligence and cognitive capacity of each student, which causes differences in their ability to explain the information they have read.

3) Creating

This study aims to develop students' creativity, particularly in designing and composing questions based on the information they have read. In practice, students are asked to write questions using the 5W+1H question words (who, what, when, where, why, and how) that are relevant to the content of the reading, as well as applying the correct use of question marks.

This digital creativity requires technical mastery of production tools (editing software, blogging platforms) as well as an understanding of aesthetics and ethics in communication. This aspect showed an increase of 19.35 %, from 60.92 % to 80.27 %. This indicates that the use of interactive multimedia can trigger students to be more creative and innovative in creating products/content related to their lessons.

4) Reflecting

The aspect of reflecting emphasizes an individual's ability to critically review their experiences, actions, and impact of their presence in the digital world. It is a process of introspection about how they use technology, the types of digital footprints they leave behind, and how their online interactions affect themselves and others. Reflection encourages meta-cognitive awareness of one's role in the broader digital ecosystem.

Overall, reflective ability increased by 19.34 % from 65.79 % to 85.13 %. Through reflection, students can learn from their mistakes, such as engaging in unhealthy conversations or accidentally spreading unverified information (hoaxes).

5) Action

The aspect of action is a crucial indicator for assessing students' level of digital literacy. In the context of digital literacy, this action is defined as the activity of sharing knowledge, either independently or through collaboration. In this study, the form of action expected from students is their ability to compile summaries based on information obtained from texts they have read in learning media.

At a more advanced level, acting also includes the ability to protect oneself and others from digital risks, such as cyberbullying, fraud, or hate speech. In this aspect, there was also an increase of 13.42 % from 70.36 % to 83.78 %..

V CONCLUSIONS

Based on the results of the research and discussion, it can be concluded that the development of Android-based interactive multimedia for social studies learning has proven to be effective in improving the digital literacy skills of ninth-grade students at SMP Negeri 17 Tulang Bawang Barat. The multimedia product developed was declared to be highly valid based on the assessments of media experts and subject matter experts, with percentages of 86.45% and 85.66%, respectively. In addition, this media was also considered interesting by users (teachers and students) with a percentage of 88.83%, and effective based on the N-Gain test results of 0.73 (high category) and an average increase in digital literacy skills of 17.01% in all aspects such as accessing, analyzing & evaluating, creating, reflecting, and action.

Based on these findings, it is recommended that teachers and schools consider integrating Android-based interactive multimedia into social studies learning more broadly. The use of this media can not only diversify learning methods that have tended to be monotonous, but also improve students' digital literacy skills, which are very important in the digital age. Furthermore, training for teachers in developing and using similar media is also necessary to ensure optimal and sustainable use of technology in learning.

For further research, it is recommended to develop interactive multimedia with broader material coverage or for other subjects, as well as to explore more diverse interactive features such as simulations or online collaboration. Long-term trials and larger sample sizes are also needed to test the consistency of the media's effectiveness in various contexts and learning conditions.

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