

Development of E-Comic Teaching Materials with a Local Wisdom Theme to Enhance High School Student's Historical Awareness

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ABSTRACT

Historical awareness is critical for students because it fosters a deeper understanding of the past, strengthens their ability to see connections between historical events, and supports the development of national identity. Effective teaching materials are needed to increase this awareness. This research aims to develop and evaluate e-comic teaching materials designed to increase students' historical awareness. Research and Development (R&D) includes four stages: defining (data collection), designing (creating teaching materials), developing (expert testing), and disseminating (application of validated teaching materials). The research subjects consisted of 6 validity experts, two teachers, 30 and 90 grade XII students to assess the pragmatism and effectiveness of the teaching materials developed. Data collection was carried out through validity and practicality questionnaires, observations, interviews, and student assessment sheets. The validity and practicality of teaching materials are analyzed qualitatively, while their effectiveness is measured quantitatively with the T and N-Gain tests. The research results show that e-comic teaching materials have a validity score of 4.02, which indicates strong validity in increasing students' historical awareness. A practicality score of 4.07 indicates ease of use, making it easier for students to access the material. The T-test with a significance of 0.001 shows a significant effect of e-comics, while the N-Gain test shows an increase in students' historical awareness by 66%, indicating the effectiveness of this intervention in achieving learning objectives. The use of e-comics teaching materials in the classroom has proven to be feasible, practical, and useful for increasing students' historical awareness, thus contributing significantly to history education.

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1. INTRODUCTION

Historical awareness is one of the important historical thinking skills in understanding and interpreting past events. The concept of historical awareness involves a thorough understanding of history as well as a meta-view of an individual's conception of history (Gerpott et al., 2021; Ortolja-Baird & Nyhan, 2022). This shows that historical awareness not only includes factual knowledge about the past, but also involves appreciating the meaning and essence of history for the present and the future. In the context of building a nation, historical awareness has a very important role (Thorp & Persson, 2020; van Boxtel & van Drie, 2018). A deep understanding of the nation's history can help individuals to get to know themselves and their nation, as well as cultivate history as part of fostering the nation's culture. Furthermore, studying history is not only about the facts and events that occurred, but also about the values contained in those events (Burke, 2019; Tosh, 2019).

Overall, concrete steps that can be taken to increase historical awareness include an increased emphasis on history learning in school curricula, with a focus on a deep understanding of the meanings and implications of historical events as well as the use of interactive and reflective teaching methods (Abram et al., 2021; Keleşzade et al., 2018; Nersäter, 2019). It is important for school curricula to place greater emphasis on history lessons (Hidayati et al., 2020; Utomo & Wasino, 2020). History is not only considered as a collection of important facts and dates, but also as a deep understanding of the meaning and implications of these historical events (Byrskog, 2022). Thus, students not only memorize historical events, but also understand their context and their impact on the development of society and the world today (Nokes, 2022). Furthermore, the application of interactive teaching techniques, including role-plays, group discussions, and case studies, can provide opportunities for students to think critically and reflectively about history (Doğantan, 2020; Southville, 2023). In the modern era, the use of interesting educational tools has become very important. These tools can enrich the learning experience and help keep history students in touch with contemporary realities. Thus, a more interesting and interactive approach not only increases students' understanding, but also fosters a sense of responsibility towards their cultural and historical heritage.

Based on the findings of teacher interviews, it is evident that there are still issues with teaching history. Specifically, the application of history instruction in schools is still not novel and primarily depends on the teachers' ability to impart knowledge, which prevents students from going to historical sites firsthand. Students often cannot feel the meaning of learning Indonesia's history that comes from their surroundings. The inability to relate historical material to actual issues or everyday life makes learning feel dry and meaningless for students. In addition, the lack of teaching materials that are relevant to the needs of students in certain areas is also a problem. This results in low historical awareness of students towards local historical relics, so that preserving historical heritage is less appreciated. As an effort to solve this, innovation is needed in the development of teaching materials in the form of E-Comics.

E-comics are visual teaching materials that are operated or used in audiovisual form (Christune et al., 2022; Nurhayatin et al., 2021; Prinandari et al., 2024). Derived from the word "comic", e-comics are an art form that uses motionless images arranged in such a way as to form a storyline. As a teaching material for learning visual communication, digital comics function as a means of communication between students and learning resources (Damopolii et al., 2021; İlhan et al., 2021; Şahin & Erol, 2022). The advantage lies in the ability of interactive teaching materials that can be developed through applications such as SmartApp Creator, allowing the creation of multi-teaching mobile apps quickly and easily. The story content in e-comics is adapted to everyday life, providing support in understanding the material being taught (Andarukmi et al., 2024; Berger et al., 2023; Suri et al., 2021). With colorful illustrations, concise storylines, and realistic characters, e-comics capture students' attention, as well as improve motivation and reading comprehension skills.

Several studies on e-comics as teaching materials focus on increasing students' interests, motivation, understanding, and character. Mayasari et al. (2023) researched the development of CTL-based e-comics, which showed that e-comics have an influence on improving student learning outcomes. Research conducted by Yulaichah (2024) explains that e-comics improve students' critical thinking skills and

creativity. In addition, research that has been conducted by Rahadian (2021) concluded that e-comics activate students' seriousness in their learning where e-comics that are lightly packaged make students tend to like reading or stories more than using time to read school textbooks. However, there has been no research that focuses on increasing students' awareness of history. So, research on the development of e-comic teaching materials to increase students' awareness of history is important to be carried out.

2. METHOD

This study uses a research and development (R&D) methodology consisting of four stages: definition, design, development, and dissemination. The first stage is definition, where data collection methods such as interviews and observations are used to analyze and identify the history education process in schools. The data collected at this stage provides important insights into the needs and challenges in history learning, which then become the basis for the next stage. The second stage, namely design, where the results of the definition stage are used to create open materials that suit the goals and competencies of students. At this stage, attention is also paid to the available historical sources, ensuring that the open materials designed are relevant and useful for students. Next, at the development stage, the teaching materials that have been designed are tested through assessments from material experts, teaching materials experts and linguistics. Input from these experts is very important to improve the quality of open materials, so that they are more effective in achieving learning objectives. Next, product trials were carried out on 2 teachers and 30 history students at one high school in Solok Regency. As according to Sugiyono (2017:91), a reasonable sample size in research is between 30 and 500, where this test is considered sufficient to gain initial insight into the practicality of the teaching materials being developed. The involvement of 2 teachers allowed researchers to obtain in-depth feedback regarding the application of teaching materials in real contexts, while 30 students provided a variety of responses that could reflect classroom dynamics. The validity criteria for teaching materials referring to certain tables.

Table 1. Standards for the Reliability and Usability of Educational Resources

Score	Description
≥ 4.00	Very Feasible
3.00 – 3.99	Feasible
2.00 – 2.99	Less Feasible
1.00 – 1.99	Not Feasible

The last step, dissemination, involves implementing educational materials to a larger audience after they have been created, validated, and put through practicality testing. This implementation aims to assess the efficacy of the developed instructional materials in raising students' historical consciousness. Ninety students participated in the assessment of the created teaching resources. An independent sample t-test was used to assess the impact of the instructional materials, and the N-Gain test was used to gauge the degree to which the resources increased students' historical awareness. This evaluation is predicated on the idea that if the score falls into the medium or high range, then the instructional materials have been effective in raising students' historical consciousness. Conversely, a low score indicates that the historical awareness that is being taught is not being increased by the course material. The provided table illustrates how the N-Gain criteria evaluate the effect of e-comic instructional resources on students' historical awareness using Hake's (1999) formula.

Table 2. N-Gain Test Criteria

Interval	Criteria
$g \geq 0.7$	High
$0.3 \leq g < 0.7$	Middle
$g < 0.3$	Low

In the experimental class, pupils will be taught utilizing e-comic teaching materials, while the control group will use PowerPoint-based learning resources. There will be two assessments used to gauge

students' historical awareness: a pretest and a posttest. The posttest, which makes use of e-comic teaching materials, will be administered in the experimental classroom following students' treatment. The pretest is intended to evaluate students' initial abilities prior to receiving therapy. The table that is provided contains information about the test design.

Table 3. Research Design

Group	Pretest	Process	Posttest
Control	O1	X	O2
Experiment	O2	Y	O4

Information:

O1 : Results of the pretest historical awareness of the control class

O2 : Results of the Pretest of Experimental Class Students

X : Teachers use power points in the control class

Y : Teachers use E-Comic in the experimental classes

O2 : Results of the posttest of historical awareness of students in the control class

O4 : Results of posttest of historical awareness of experimental class students

The evaluation of students' historical awareness will be carried out through the preparation of essay questions that include historical awareness indicators that have been set. This test will evaluate four main indicators: i) comprehend historical facts and recognize the connections between the past, present, and future; ii) analyze historical events and connect them to social reality; iii) interpret historical events' moral lessons; and iv) show an interest in learning more about or continuing the study of history. To ensure that the questions that will be used to evaluate students' historical awareness have adequate validity and reliability, the instrument's validity and reliability tests are conducted as indicated in the following table..

Table 4. Instrument Validity Results

No.	Question indicators	Sig. (2-tailed)
1.	comprehend historical facts and recognize the connections between the past, present, and future	0.561
2.	analyze historical events and connect them to social reality	0.671
3.	interpret historical events' moral lessons	0.682
4.	show an interest in learning more about or continuing the study of history	0.601

The significant values of all four items are above 0.05, as Table 3 demonstrates. This suggests that the four questions have merit as a tool for assessing students' historical awareness. Additionally, the attached table shows the outcomes of the instrument reliability test.

Table 5. Instrument Reliability Test Results

Cronbach's Alpha	N of Items
0.702	4

The instrument's reliability above the 0.05 level, as indicated by the Cronbach's Alpha score of 0.702. Consequently, it may be said that the four inquiry types are trustworthy for gauging students' historical consciousness.

In this research, data analysis was carried out using qualitative and quantitative approaches. Thematic analysis will be employed as the qualitative analysis method to examine expert opinions on the caliber of instructional resources.. This method allows researchers to identify, analyze, and report patterns or themes that emerge from expert feedback. This process will not only increase rigor in understanding expert perspectives, but also help in developing and refining teaching materials that better suit students' needs. Meanwhile, to analyze the impact of using e-comic teaching materials on students' historical awareness, quantitative methods will be applied using the Independent Sample T-test via SPSS version 25.0 software.

3. FINDINGS AND DISCUSSION

3.1 Define stage

At this stage, the researcher analyzed the students' needs, curriculum and personality. According to the findings of the needs analysis, learning becomes boring and pointless if there are no teaching resources that match the students' needs in a particular subject area and their inability to relate historical materials to actual issues or daily life causes learning to feel dry and meaningless. Based on the educational curriculum used, the school uses the Independent Curriculum. The Independent Curriculum emphasizes historical thinking skills and material content on local history materials. Based on the analysis of students' character, it was found that students' inability to relate historical material to actual issues or daily life and their low awareness of local historical heritage made learning feel dry and meaningless, as well as reduced appreciation for the preservation of historical heritage.

3.2 Design stage

In the design stage of e-commerce media development, several important steps are taken to ensure the final product is of high quality and informative. First, e-comics are developed using the Canva app, which provides a variety of graphic design tools that make it easy to create compelling visual elements. Canva allows users to create designs easily and integrate various media in the appropriate format.



Figure 1. The E-Comic Development Process Using Canva

Second, artificial intelligence (AI) features are used to provide a clearer picture of the events presented in e-comics. AI aids in the design process by generating illustrations or visual elements that can enrich the content and provide more in-depth context about the story being presented.

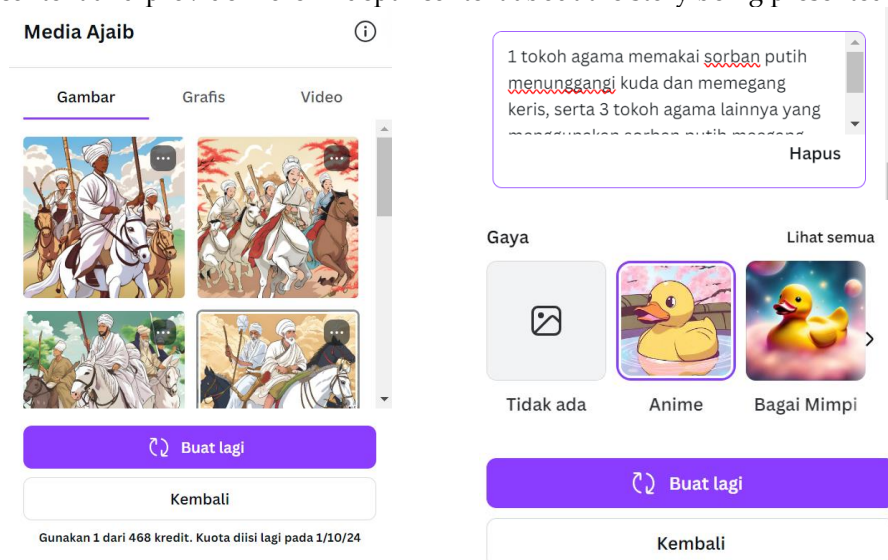


Figure 2. AI-assisted image generation process

Furthermore, e-comics consist of several important parts. The first part is the cover, which serves as the front cover and gives the reader a first impression. The cover is designed with eye-catching visuals to attract attention and provide preliminary information about the content of the e-comic.

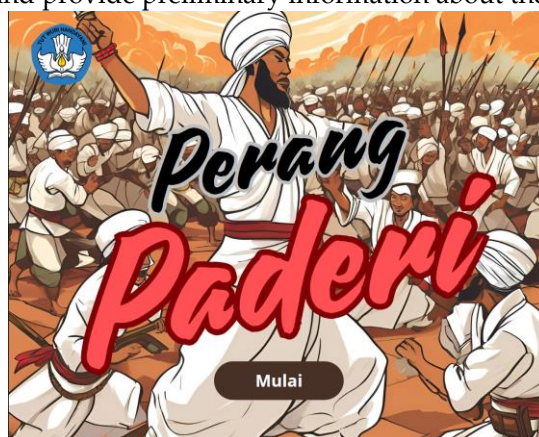


Figure 3. E-Comic Cover

The second part is the introduction of e-comics and the explanation of the features. This introduction provides an overview of the purpose of e-comics and the features they contain. This helps readers understand what they will learn and how they can interact with the e-comic.



Figure 4. E-Comic Description and Feature Explanation

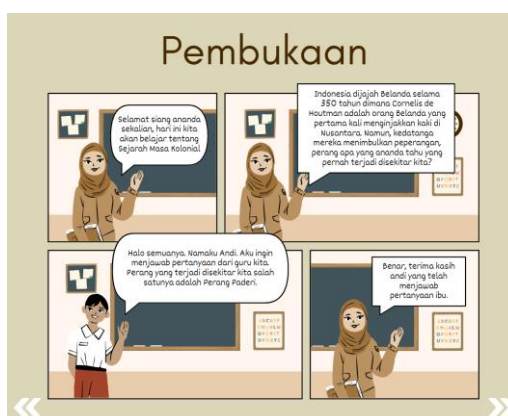


Figure 5. Introduction Comics About the Materials to be Taught

The third part is YouTube (YT) videos integrated in e-comics. These videos serve as visual and audio supplements that can enrich the reader's learning experience by providing more detailed explanations or illustrations of the events discussed.



Figure 6. Connected YT Videos in E-Comics

The fourth part is an overview of the story of the Priestly War. This section presents a detailed narrative of the historical event, using text and images to help readers understand the context and details of the Priestly War.



Figure 7. Priest-War E-Comics

Finally, e-comics are equipped with evaluation questions. This question is designed to test the reader's understanding of the material that has been presented. This evaluation is important to ensure that the reader can apply and remember the information that has been learned from the e-comic. Overall, the e-comic design process involves the use of advanced design tools, the integration of modern technological features, and a well-organized content structure to create an interactive and effective learning experience.

3.3 Development Stage

3.3.1 Expert Validation Test

At this stage, experts and practitioners carry out theoretical considerations related to media validation. The validator team consists of material experts, media experts, and linguists. The task of the validators is to validate the learning media that has been designed at the media design stage. In this stage of development, two activities will be carried out. First, validation will be conducted with material, media, and language experts. Second, the teaching materials should be revised after the validation process. The validity results are presented in the following table.

Table 6. Expert Validation Results

Aspects	Score	Information
Material	4,04	Highly valid
Media	4,12	Highly valid
Language	3,90	Valid
Average	4,02	Highly valid

The assembled e-comic teaching materials received a score of 4.02 on the validation test, which is classified as "Very Valid." These mean scores provide strong evidence that the standard of validity for using e-comics teaching resources to raise students' historical awareness.

3.3.2 Practicality Test

The practicality test is carried out after the completion of the validation process. The purpose of the practicality test is to assess the practicality of the use of e-comic teaching materials that have been developed for students' historical awareness. There are 4 assessment items used to evaluate the practicality aspect. This aspect was assessed by 2 teachers and 30 students. The practicality test is carried out by providing products that have been validated by media experts and material experts, as well as an assessment sheet in the form of a practicality questionnaire. The average score of the validation results of the practicality aspect can be seen in the following table after the data has been processed.

Table 7. Practicality Test Results by Teachers and Students

No.	Aspects	Score	Criterion
1.	Content	4,03	Very Practical
2.	Practicality	4,12	Very Practical
3.	Language	4,05	Very Practical
4.	Design	4,10	Very Practical
Average		4,07	Very Practical

Based on the facts analyzed in the above table, it is evident that teachers and students gave practicality an average score of 4.07. This rating, which falls into the "very practical" category, is indicative of a favorable opinion of the created e-comic teaching resources. Therefore, it can be said that e-comic instructional materials are highly effective and highly useful in helping pupils acquire historical awareness.

3.4 Disseminate stage

At this point, 90 students' SMAN in Solok Regency had received a large distribution of it. The purpose of this step was to ascertain how students' historical awareness was impacted by e-comic instructional materials. The efficacy of the generated e-comic teaching resources in raising students' historical awareness is assessed using the T-test. According to the T test's decision-making criterion, e-comic instructional materials have an impact on students' historical awareness if the Significance (Sig.) value is less than 0.05. However, there is no discernible impact of using e-comic teaching materials on students' historical awareness if the Sig. score is more than 0.05. The two testing phases of the media effectiveness test procedure are the pre-test, which is conducted on the same responder before media usage, and the post-test, which is conducted after media use. The table that is provided below will show the T test results.

Table 8. T Test Results

t-Test Results	Significance
of the Independent Sample Test	0.001

The t-test's significance value of 0.001, which is less than the significance threshold value of 0.05, can be observed from the data in the table. According to the results, using e-comic teaching resources has a major positive effect on students' historical awareness.

Additionally, an N-Gain test was used to learn more about the extent to which students' historical awareness has grown. The N-Gain test results will be shown in the table below.

Table 9. N-Gain Score

No.	Question indicators	N-Gain Score	Category
1.	comprehend historical facts and recognize the connections between the past, present, and future	0.61	Medium
2.	analyze historical events and connect them to social reality	0.73	High
3.	interpret historical events' moral lessons	0.68	Medium
4.	show an interest in learning more about or continuing the study of history	0.65	Medium
Average		0.66	Medium

The analysis indicates that using e-comic teaching materials has successfully increased students' historical awareness by 0.66, or approximately 66%. Students often find it engaging and relatable. Many report feeling more emotionally connected to the material, as the visual storytelling brings historical figures and events to life in ways traditional textbooks may not. For instance, one student noted, "The e-comics made me feel like I was part of the story. I could visualize the events, which helped me remember them better." Such reflections highlight the cognitive and emotional engagement fostered by e-comics, enhancing retention and understanding of complex historical narratives.

Teachers, on the other hand, may emphasize how e-comics facilitate discussions and critical thinking. A teacher remarked, "The students are more willing to participate in discussions after reading the e-comics. Students can relate to the characters and often draw parallels to current events, which shows students are not just memorizing facts but really thinking about history. This feedback suggests that e-comics not only improve comprehension but also encourage a deeper exploration of historical contexts and their relevance today.

Furthermore, the results of this study indicate that the creation of instructional materials has demonstrated significant validity, a high degree of reliability, good practicality, and demonstrated efficacy in raising students' historical awareness. These findings reaffirm that utilizing e-comic instructional resources is the proper move and improves student awareness of history while also having a good effect on education.

Discussion

The study results indicate that the developed e-comic teaching materials are valid, practical, and effective for enhancing students' historical awareness, particularly regarding the Paderi War. The validity assessment yielded an average score of 4.02, confirming that the e-comic effectively supports students' historical understanding. Similarly, the practicality test produced an average score of 4.07, reflecting a positive evaluation of the materials. Furthermore, the T-test results revealed a significance value of 0.001, suggesting a substantial impact of the e-comic on students' historical awareness. The N-Gain test was conducted to evaluate the increase in students' historical awareness, and resulted in a score of 0.66 or 66%. This finding indicates a moderate increase in historical awareness. The results of this study are in line with previous research, such as that conducted by Mayasari et al. (2023), which showed a positive impact of e-comic teaching materials on student learning outcomes. Furthermore, Yulaichah (2024) highlighted that e-comics not only improve students' critical thinking and creativity, but also engage them more effectively in learning. E-comics, being more accessible and fun than traditional textbooks, can activate students' interest and motivation in learning (Rahadian, 2021).

E-comics are teaching materials that can be adapted to the development and characteristics of students, creating an interactive and fun learning atmosphere (Atikah, 2020; Prinandari, 2024). Through e-comics, students can be actively involved as there are sections that require their participation and also link to images and videos that are relevant to the material, creating a dynamic learning experience (Linardatos & Apostolou, 2023; Zamora, Bravo, & Padilla, 2021). This teaching material also encourages students' enthusiasm and interest in learning, strengthens the interaction between teachers

and students, and contributes to improving students' science literacy and thinking skills (Akanca, 2020, 2021; Fitria, Malik, Mutiaramses, Halili, & Amelia, 2023).

According to Multimedia Learning theory, the use of a combination of text and images in e-comics supports the processing of information through both verbal and visual pathways, making it easier for students to understand the material presented (Apostolou & Linardatos, 2023). Multimedia learning theory emphasizes the importance of using different types of media, such as images, videos, and text to enrich the learning experience and help students understand the historical context more deeply. On the other hand, constructivism theory focuses on active and student-centered learning, where students construct their understanding through interaction with new information and experiences. By integrating these two theories, students not only passively receive historical information, but can also construct their knowledge through active exploration and reflection, thus increasing their awareness and understanding of historical events. Meanwhile, constructivism theory emphasizes that students actively construct their knowledge through interaction with content. Electronic comics, with their engaging narratives and rich visuals, not only stimulate students' interest but also allow them to reflect, interact, and construct their understanding based on the experiences presented in the story.

The advantages of e-comics as a learning medium compared to other teaching materials such as textbooks, LKPD, or teaching modules, namely: i) e-comics can create students' interest in learning by presenting learning materials in an interesting and entertaining way (Paridah, Hanifah, & Sunaengsih, 2024; Prinandari, Sahrina, & Purwanto, 2024). With attractive visual images, students tend to be more interested and involved in the learning process. This is also in line with Hutchison's findings that teachers see e-comics can help motivate students and increase individual participation by up to 79%; ii) e-comics can make it easier for students to understand abstract material concepts through clear visualization and interesting storylines (Susanto, Setiawan, Mahanal, Firdaus, & Tsany Kusmayadi, 2024); iii) e-comics provide flexibility in accessibility where students can access them through devices such as mobile phones or laptops, allowing learning to be carried out independently outside the classroom. In addition, e-comics can also be shown in the classroom through the projector LCD, allowing for more effective and engaging technology-based learning (Aristi, Janitra, & Prihandini, 2023); iv) its ability to stimulate students' imagination, improve analytical skills, and help students find information independently (Mayasari, Yulianti, Sinaga, & Herpratiwi, 2023; Sebayang, Hasruddin, & Milfayetty, 2023; Yulaichah, Mariana, & Wiryanto, 2024). Yonanda (2021) mentioned that comic media is able to attract students' interest because it is liked by children, full of pictures, and can convey material in a more fun way. This makes students more interested in learning the material presented in e-comics, as well as improving their understanding without having to rely on rote learning.

E-comics have a striking advantage compared to traditional teaching materials such as textbooks, LKPD, and modules in increasing students' awareness of history. E-comics are able to create a more engaging and interactive learning experience with the use of images, text, and multimedia, which dynamically present historical material and attract students' attention to explore more deeply. In addition, its easy accessibility through electronic devices such as smartphones, tablets, or computers provides flexibility for learning anywhere and anytime, in contrast to the limitations of access to traditional teaching materials. E-comics can also stimulate students' imagination and creativity with a combination of visual and interactive elements, thereby helping students understand historical events more deeply and develop better analysis and interpretation skills, making e-comics an effective and inspiring learning tool in introducing history to students. In conclusion, the use of e-comic teaching materials in history learning has succeeded in increasing students' historical awareness, showing validity, reliability, practicality, and effectiveness.

4. CONCLUSION

The results showed that e-comic teaching materials have significant advantages over traditional teaching materials such as textbooks, LKPD, and modules in increasing students' historical awareness. The T-test results, with a significance value of 0.001, stated that e-comics had a significant effect on

increasing students' historical awareness. Furthermore, the N-Gain test showed an increase in students' historical awareness by 66%. This finding is in line with previous research that states the positive impact of e-comics on student learning outcomes. E-comics not only enhance critical thinking and creativity, but are also more engaging than traditional textbooks, so they can increase student motivation. In addition, e-comics create an interactive and fun learning atmosphere, allowing students to be actively involved through participation and access to related images and videos. The use of e-comics that combine text and images in accordance with Multimedia Learning theory can improve students' understanding of historical material through a more effective information process. On the other hand, the Constructivism approach encourages students to actively construct their knowledge through interaction and reflection on engaging narratives and visuals, thus increasing their historical awareness. Although e-comic teaching materials have successfully improved students' historical awareness ability in high school, this study has limitations because it is limited to one historical source, and the scope of the trial is limited to SMAN in Solok Regency, so further research needs to expand historical sources and trial subjects to get more representative results. In addition, researchers are expected to develop e-comic learning media in other learning subjects. Based on the research findings, researchers recommend that history teachers utilize e-comic teaching materials to learn history in high school as an alternative that can increase students' interest, motivation, and awareness of history.

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