International Journal of Research and Review
[Indexed, Peer-Reviewed Journal]
Volume 13; Issue: 4; April 2026
Website: www.ijrrjournal.com
Research Paper *E-ISSN: 2349-9788; P-ISSN: 2454-2237*

The Impact of Digital Comic Based Learning on History Comprehension of Students at Senior High School in Semarang City

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DOI: https://doi.org/10.52403/ijrr.20260424

ABSTRACT

History education aims to instil important value and shape students' understanding of historical developments at the local, national, and global levels. However, history education in schools still faces problems in the form of low student understanding of broad subject matter. One effort to improve the quality of learning is the use of innovative learning media, such as digital comics that present material visually and narratively. This study aims to analyze the effect of using digital comic learning media on the historical comprehension of 11th grade students at SMA Negeri 7 Semarang. The study uses an experimental approach with a quasi-experimental design. The study population consist of all 11th grade students, with sample class XI-01 as the experimental class and class XI-02 as the control class, selected using nonprobability sampling technique of incidental sampling. The results of data analysis using the t-test show a t-value of-1.923 with a significance (sig. 2-tailed) of 0.059, which is greater than the significance level of 0,05. These results indicate that the use of digital comic learning media does not have a significant effect on the historical material comprehension of 11th grade students at SMA Negeri 7 Semarang.

Keywords: Learning Media, Digital Comics, Understanding Historical Material, History Learning

INTRODUCTION

According to Kaniawati et al., (2023), learning is a process in which students interact with teachers who serve as a source of knowledge for students in the context of the learning environment, namely as a medium for acquiring knowledge, understanding concepts, and shaping students' characters through guidance from teachers or educators. One of the important disciplines in this context is history. History is a discipline that studies past events, the development of civilization, and human interaction. History learning is not just a teaching and learning activity, but also contains important values that can be instilled in students (Suryadi & Mahmudi, 2024).

History education has several objectives. In the Merdeka curriculum, the objectives of history education are outlined in the ministerial regulation governing the Indonesian education curriculum. Kurniawan (2022) explains that these objectives are to shape students' understanding of the historical development process at the local, national, and global levels. As stated in Permendikbud Ristek No. 56 of 2022, "History education is expected to

encourage students to understand historical developments and foster critical, appreciative, and objective attitudes towards their own nation's history and the history of other nations." The Merdeka Curriculum is an initiative of the Minister of Education and Culture, Nadiem Anwar Makarim, which aims to achieve a free, enjoyable, and flexible learning atmosphere (Purnomo & Prayoga, 2023).

To achieve these history learning objectives, high-quality learning must be implemented, and the learning process also requires adequate supporting components so that learning objectives can be achieved and learning becomes high-quality (Purnomo & Nabila, 2024). High-quality learning must fulfill the element of compatibility between the elements in learning. One important element in designing a high-quality learning process is learning media. The role of media in the learning process is very important because the delivery of material by teachers will be more effective so that learning objectives can be easily achieved and students can understand the material that has been taught (Purnomo et al., 2025).

Good student quality and maximum learning outcomes depend on the selection of learning media. Learning media that is used repeatedly or continuously will cause students to become bored. Therefore, innovative and interactive learning media are needed to achieve the desired learning objectives (Payanti, 2022). Pramono et al., (2024) argue that with the development of technology, teachers must adapt to the characteristics of students, especially Generation Z, who are familiar with and accustomed to using technology. Thus, in designing learning stages, teachers need to consider the various characteristics of Generation Z so that learning objectives can be achieved (Pramono et al., 2024). One alternative that can be used is the use of digital comic learning media. Digital comics can present information or material visually and narratively, thereby helping students understand the material in a more enjoyable way.

The teaching of history is influenced by various factors, not only by the teacher's delivery but also by the educational media used. Research by Purnomo & Kurniawan, 2025)shows that students' understanding of historical material is influenced by formal education, their social environment, and the media used in the learning process. Therefore, engaging and easy-to-understand media, such as digital comics, are needed to help students improve their understanding of the material more effectively.

In line with these findings, the use of innovative and contextual learning materials is essential to foster a deeper understanding of history among students. Interactive and student-centered learning approaches enable students not only to passively receive information but also to construct historical meaning in a critical and reflective manner. In this context, digital comics can serve as an effective alternative medium because they integrate visual, narrative, and contextual elements that are relevant to students' lives, thereby not only increasing their interest in learning but also strengthening their conceptual understanding and the internalization of national values (Purnomo & Kurniawan, 2025).

Based on an interview with one of the 11th grade students at SMA N 7 Semarang on September 17, 2025, there are problems related to understanding history learning materials. The problem that occurs in history learning at SMA N 7 Semarang is related to understanding historical material, where students tend to find it difficult to understand history material that is broad in scope. Thus, a new approach is needed that can improve students' understanding of historical material in history lessons. Based on this description of the problem, one alternative that can be adopted is the use of interactive and engaging learning media. One type of learning media that is both engaging and interactive is digital comics. With digital comics, students will be actively involved in learning because they will not only read but also interact with the content presented. In this way, students will

play an active role in building their own understanding of historical material.

The objectives of this study are: 1) to assess the historical material comprehension ability of grade XI students at SMA N 7 Semarang using digital comic learning media, 2) to assess the historical material comprehension ability of grade XI students at SMA N 7 Semarang without using digital comic learning media, 3) to analyze the effect of using digital comic learning media on historical material comprehension in the experimental class and control class. Based on the above background, this study is expected to make a positive contribution to the development of history education in Indonesia, as well as to improve the understanding of material for grade XI students in history subjects at SMA N 7 Semarang.

LITERATURE REVIEW

A. Learning Media

Media comes from the Latin word medium, which means an intermediary or conveyor of messages from the sender to the receiver (Rohani, 2020). This definition is in line with the opinion of Mukarromah & Andriana (2022), who state that the term media means intermediary, both in Latin and Arabic wasaail, which functions to convey messages to the receiver. In the context of learning, media acts as an intermediary to help teachers convey material so that it is easier for students to understand. Wulandari et al., (2023) also explain that learning media is a tool used by teachers to convey learning information effectively so that the material can be well received and understood by students.

Learning media are tools or resources used to support the learning process and help teachers deliver material to students in various forms, such as images, videos, teaching aids, and digital technology, in order to improve students' understanding of the material being taught (Mukarromah & Andriana, 2022). Learning media is closely related to the material because it serves to reinforce the concepts being conveyed. This is in line with Wulandari et al., (2023), who state that learning media is an important element in education that can facilitate understanding of the material, stimulate interest in learning, increase motivation, and have a positive psychological impact on students.

B. Digital Comics

Comics are a form of cartoon that presents stories through a sequence of images and narratives to entertain and provide an engaging visual experience for readers (Ratnasari et al., 2020). This is in line with the opinion of Wahyuni et al., (2023), who define comics as a sequence of images with a clear storyline, in cartoon form, and used as a medium for conveying information that invites readers to respond aesthetically. Based on this definition, comics can be concluded as a form of art that combines images and text in sequence to convey a story.

Digital comics are comics published in digital format, consisting of interconnected images and equipped with multimedia elements such as audio, interactive animations, and hyperlinks, providing a more immersive reading experience Medina et al., (2024). In addition, digital comics also utilize the internet and websites as a means of publication, making them more accessible than printed comics (Febyanti et al., 2023).

C. Understanding of Historical Material

Understanding historical material is the ability of students to grasp, interpret, and relate historical concepts, events, and processes in a meaningful way, not only at the level of memorizing facts, but also at the level of reasoning. This understanding is reflected in the ability of students to explain the cause and effect relationships of historical events, connect past events with contemporary social contexts, and interpret the value and meaning of history in everyday life (Kurniawati et al., 2022). This definition is in line with Susanto (2016) opinion, namely that comprehension is the ability to grasp the meaning of the material or subject

being studied. Comprehension reflects the extent to which students can receive, absorb, and understand the material taught by the teacher. In addition to the material, comprehension also includes the ability of students to understand what they read, see, experience, and feel.

MATERIALS & METHODS

This study uses a quantitative approach with a quasi-experimental design. The quantitative approach emphasizes the objective collection and analysis of numerical data to test predetermined hypotheses (Marinu, 2023). The experimental method is used to identify the effect of a treatment on a specific variable under controlled conditions (Soegiyono, 2013). The independent variable in this study is digital comic learning media, while the dependent variable is students' understanding of history material.

The research subjects consisted of two classes, namely the experimental class and the control class. The experimental class was given treatment in the form of learning using digital comic media, while the control class carried out learning without using this media. Hypothesis testing was conducted using a t-test to compare the posttest results between the experimental class and the control class. The difference in posttest scores was used to determine the effect of digital comic media on students' understanding of history material, where a significant difference with higher scores in the experimental class indicated an effect, while the opposite result indicated no significant effect.

Statistical Analysis

Before conducting data analysis, this study first carried out analysis requirements tests, including normality and homogeneity tests. The normality test was used to determine whether the data was normally distributed, using the Shapiro–Wilk test because the number of respondents was less than 50. Decisions were based on a significance value of 0.05, where the data was declared to be normally distributed if it met the test criteria. The normality test was performed using Microsoft Excel software. Next, the homogeneity test was performed to determine the similarity of variance between the experimental class and the control class using the Levene test with a significance level of 0.05. The data was declared homogeneous if the test value met the specified criteria.

Hypothesis testing was performed using the t-test (independent sample t-test) to determine the difference in the average pretest and posttest results between the experimental class and the control class. The null hypothesis (H0) states that the average understanding of history material among students in the experimental class is not higher than or equal to that of the control class, while the alternative hypothesis (Ha) states that the average of the experimental class is higher than that of the control class.

RESULT AND DISCUSSION

This study was conducted from October 1 to November 30, 2025, with the research subjects being 11th grade students at Semarang State High School 7. The research sample consisted of two classes, namely class XI-01 as the experimental class and class XI-02 as the control class. Prior to the main study, an instrument trial was conducted in class XI-05 on October 2, 2025. Of the total 50 questions tested, 21 questions were declared valid and reliable, and were then used as pretest and posttest instruments. The initial stage of the study began with a pretest to determine the students' initial abilities. The pretest for the experimental class was conducted on October 9, 2025, and for the control class on October 10, 2025. The pretest was conducted online via Google Form with a duration of 90 minutes. After the pretest, both classes were given three learning sessions, each with a duration of 2 × 45 minutes, using teaching modules designed by the researcher.

In the experimental class, the learning process used digital comic learning media with material on the national movement and the struggle of Ki Hajar Dewantara. Learning

began with an introduction to the material using PowerPoint, followed by activities of reading and understanding digital comics independently and in groups. During the learning process, students also took part in evaluations in the form of interactive quizzes using the Wordwall platform and the educational game Family 100. In the last learning session, students were asked to compile a concept map based on the material in the digital comics and present their results in front of the class.

Meanwhile, the control class conducted learning using conventional methods in the form of lectures using PowerPoint media without the aid of digital comics. The material, time allocation, and number of meetings were adjusted to the experimental class so that the treatment was comparable. Learning evaluation in the control class was carried out through question and answer sessions, quizzes, and the preparation of concept maps based on material delivered orally by the teacher.

The final stage of the study was the administration of a posttest to measure the students' final abilities after the treatment. The posttest for the experimental class was conducted on November 13, 2025, and for the control class on November 14, 2025. The posttest instrument consisted of 21 questions, which were the same as the pretest, and was completed online through Google Forms with a duration of 90 minutes. The pretest and posttest data were then analyzed to determine the difference in understanding of history material between the experimental class and the control class.

Table 1 Category Score

Class	Category	Number of Students	Average
Experiment (XI-01)	Pretest	36	62,27
Control (X0-02)		36	61,61
Experiment (XI-01)	Posttest	36	86,72
Control (XI-02)		36	81,94

Source: (2025 Research Data, Processed)

The research results table shows a comparison of the average scores for students' understanding of history material between the experimental class and the control class at the pretest and posttest stages. At the pretest stage, the average score for the experimental class (XI-01) was 62.27 and for the control class (XI-02) was 61.61, indicating that the initial abilities of the two classes were relatively equal. After the learning treatment was administered, there was an increase in the average scores of both classes. The experimental class obtained an average posttest score of 86.72, while the control class obtained an average score of 81.94. Although the experimental class showed a higher increase in scores than the control class, these results need to be further analyzed through statistical tests to determine the significance of the effect of using digital comic learning media on students' understanding of historical material.

Quantitative data processing in this study used Statistical and Service Solution (SPSS) 25 and Microsoft Excel Software.

Normality Test

This test was used to measure whether the data was normally distributed or not. This study used the Kolmogorov Smirnov test with the help of Microsoft Excel, because the sample size for both classes was 36 students.

Table 2 Normality of experimental and control class data

Class		T_3 Calculate	Shapiro Wilk Table	Description
Experiment (XI-01)	*Pretest*	0,949	0,935	Normal
Control (XI-02)		0,9387365	0,935	Normal
Experiment (XI-01)	*Posttest*	0,981736	0,935	Normal
Control (XI-02)		0,93693	0,935	Normal

Source: (2025 Research Data, Processed)

The data above shows that both the experimental class and the control class, based on the pretest and posttest results, have a calculated T3 value > Shapiro Wilk table, which means that all data is normally distributed, so that the statistical analysis performed is a parametric statistical analysis using a t-test.

Homogeneity Test

The homogeneity test is used to determine the similarity of variance between the control class and the experimental class. This homogeneity test uses the pretest and posttest scores of the experimental class and the control class. In this study, the Levene test was used. The basis for determining the decision in the Levene test is done by comparing the calculated W value with the F table at a significance level of 5% (0.05). The interpretation criteria are as follows: when the calculated W is < F table, the variance between groups is considered homogeneous. However, when the calculated W is > F table, the variance is declared non-homogeneous. This homogeneity test was conducted using Microsoft Excel software.

Table 3 Data on the homogeneity of pretest and posttest variance in the experimental class

Data	W Calculated	Table F	Description
Pretest	3,166	4,1	Homogeneous
Posttest	0,706	4,1	Homogeneous

Source: (2025 Research Data, Processed)

The data above shows that W count < F table, which means that all data is homogeneous, so the statistical analysis performed is parametric statistical analysis with a t-test.

T-test

If the requirements are met, then the research hypothesis is tested. This research hypothesis test is based on the difference or discrepancy between the pretest and posttest scores of the control class and the experimental class. This test uses the Independent Sample T-Test, because the researcher uses two groups whose members are different from one another. In testing this hypothesis, the researcher uses SPSS 25 analysis.

The testing criteria are as follows.

Formulating hypotheses:

Ha: Digital comics have a significant effect on the understanding of history material for grade XI students at SMA N 7 Semarang.

Ho: Digital comics have no effect on the understanding of history material for grade XI students at SMA N 7 Semarang.

Testing criteria:

If sig α > (0.05), then H0 is accepted and Ha is rejected.

If sig α < (0.05), then H0 is rejected and Ha is accepted.

Table 4 Posttest T-Test for Experimental Class and Control Class

Group Statistics					
	class	N	Mean	Std. Deviation	Std. Error Mean
Posttest		36	81.94	10.245	1.708
	Experiment	36	86.72	10.828	1.805

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Posttest	Equal variances assumed	.251	.618	-1.923	70	.059	-4.778	2.484	-9.733	.177
	Equal variances not assumed			-1.923	69.787	.059	-4.778	2.484	-9.733	.177

Source: (2025 Research Data, Processed)

The t-test results using SPSS 25 on the posttest data showed a t-value of −1.923 with a significance value (Sig. 2-tailed) of 0.059, which is greater than the significance level of 0.05. Based on the testing criteria, the null hypothesis (H_0) is accepted and the alternative hypothesis (H_a) is rejected, so that the use of digital comic learning media does not have a statistically significant effect on the understanding of history material by students in grade XI at SMA Negeri 7 Semarang.

However, the difference in average scores between the experimental and control classes indicates an improvement in learning outcomes. Therefore, this study is supplemented with qualitative data in the form of interviews with students from both classes to obtain a more in-depth picture of the learning experience, understanding of the material, and student responses to the learning process that has been implemented.

The results of interviews with students in the experimental class showed that the use of Ki Hajar Dewantara digital comics was considered interesting and helpful in understanding historical material. The presentation of material through images and storylines made learning more enjoyable and made it easier for students to remember the life stories and struggles of historical figures in stages. In addition, evaluation activities such as Wordwall quizzes, Family 100, and concept map creation were considered to be able to increase student activity in learning. However, students still need additional explanations from teachers to understand the historical context more deeply, and feel that the limited time for reading digital comics results in suboptimal understanding.

Meanwhile, interviews with students in the control class showed that history learning through lectures can still be understood well if delivered in a coherent and clear manner by the teacher. However, this method is considered to be less interesting and has the potential to cause boredom. Interactive evaluation activities such as Wordwall quizzes, Family 100, and concept map creation continue to help increase student participation and strengthen their understanding of the material. The control class students' understanding is highly dependent on their ability to listen to and take notes on the teacher's explanations, so students who are less focused have difficulty understanding the history material.

Learning media are tools or resources used to support the learning process and help teachers deliver material to students in various forms, such as images, videos, teaching aids, and digital technology, which serve to improve students' understanding of the learning material (Mukarromah et al., 2022). One form of digital learning media is digital comics, which are comics presented in digital format with a series of interrelated images and equipped with multimedia elements such as audio, interactive animations, and hyperlinks, thereby

providing a more in-depth and immersive learning experience for readers (Medina et al., 2024).

The insignificant effect of digital comic–based learning media on students' historical comprehension can be linked to challenges in instructional planning and teacher literacy in history learning. This is in accordance with Purnomo et al., (2021) opinion that although innovative media is designed to support the development of 21st-century skills, including the 4Cs, its effectiveness greatly depends on the teacher's ability to design contextual lesson plans and explain the material clearly. Cognitive Theory of Multimedia Learning (CTML) states that learning will be more effective when information is presented through a combination of words and visuals that are in line with how the human mind works. CTML is based on three main principles, namely the existence of two information processing channels (verbal and visual), the limited capacity of each channel, and the need for active cognitive processes in the form of selection, organization, and integration of information for meaningful learning (Nurhatmi, 2025). Therefore, educational multimedia must be designed with the appropriate instructional approach to optimize information processing and prevent excessive cognitive load. This is in line with the findings of Putri et al., (2025), who emphasize that the effectiveness of multimedia-based learning materials depends on the application of CTML principles, such as coherence, segmentation, and reduction of redundancy, because inaccuracies in their application can hinder student understanding.

Understanding of the material is influenced by internal and external factors of the students (Nurhangesti, 2024). Although digital comics can increase interest and activity, other factors such as limited learning time, the need for teacher explanations, and the effectiveness of the lecture method in the control class resulted in no significant difference in understanding between the two classes.

CONCLUSION

Based on research conducted at SMA Negeri 7 Semarang on the effect of using digital comic learning media on the understanding of history material for grade XI students, it can be concluded that:

1. In the experimental class, namely class XI – 01, history lessons were conducted using digital comic learning media packaged based on teaching modules compiled by the researcher. The pretest results showed an average score of 62.27. The posttest results showed an average score of 86.72. Based on the average scores between the pretest and posttest in the experimental class, there was an increase in students' understanding of history material before and after being given treatment using digital comic learning media.
2. In the control class, namely class XI-02, history lessons were conducted without using digital comic learning media or learning using PowerPoint media with a lecture method, similar to daily lessons, based on teaching modules compiled by researchers. The pretest results showed an average of 61.61. The posttest results showed an average of 81.94. Based on the average scores between the pretest and posttest of the control class, it shows that there is a difference in students' understanding of history material before and after being given treatment without using digital comic learning media.
3. Based on the results of the T-test calculation using SPSS 25 on the posttest data and based on the decision making, it is known that the T-count value is -1.923 with a significance value (Sig. 2-tailed) of 0.059. This value is greater than the significance level of 0.05. Therefore, based on the decision-making criteria used, H0 is accepted and Ha is rejected. These results indicate that digital comics do not have a statistically significant effect on the historical material comprehension of 11th-grade students at State Senior High School 7 in Semarang.

Declaration by Authors

Acknowledgement: None

Source of Funding: None

Conflict of Interest: No conflicts of interest declared.

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How to cite this article: Nadya Fariha Istiqomah, Arif Purnomo. The impact of digital comic based learning on history comprehension of students at senior high school in Semarang City. *International Journal of Research and Review*. 2026; 13(4): 252-261. DOI: *https://doi.org/10.52403/ijrr.20260424*

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