



The Effectiveness of E-Comic Utilization as a Learning Media for Tsunami Disaster Mitigation at SMA 1 Pertiwi Padang City

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ABSTRACT

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Learning in the 21st century is different from learning in the past. Technological advances are growing rapidly in various areas of life, including education. With this change, it gives hope to be able to realize the nation's ideals (BNSP, 2010). The aim of this research is to see the effectiveness of using E-Comic in learning disaster mitigation material in classes XI IPS 1 and XI IPS II. The results of this research obtained an experimental pre-test score of 53.40, a post-test score of 87.10, while the control class had a pre-test score of 51.87 and a post-test score of 61.53. There was a significant increase in the Pre-Test and Posttest of the Control Experiment Class. This shows that E-Comic media can be used by educators as a learning medium in the process of learning activities at school to improve learning outcomes, increase student understanding and also be able to reduce student boredom if they only use the lecture method. Based on the response from educators, the E-Comic media developed in this research responded very well.

Learning, Use of E-Comic, Effectiveness, Tsunami Disaster

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INTRODUCTION

Learning in the 21st century differs from learning in the past. Technological advancements have rapidly progressed in various aspects of life, including education. These changes offer hope for realizing the nation's aspirations. Students and teachers face challenges and opportunities to thrive in the knowledge era of the current information age (Lubis & Ritonga, 2023). The goal of 21st-century National Education is to achieve the nation's aspirations, as stated in Law Number 20 of 2003. The aim is to create a learning environment where learners actively contribute their potential for spiritual and religious strength, self-control, personality, intelligence, noble character, and the skills needed for themselves, society, the nation, and the country. From this

understanding, the importance of education, including disaster education, becomes evident (Ritonga et al., 2022).

The implementation of disaster mitigation learning is part of educational efforts, as education plays a crucial role in enhancing disaster knowledge (Hanso, 2019). Education as lifelong education. Disaster education takes various forms, ranging from community-based disaster management to disaster-aware education and the local community's wisdom in handling disasters (Aeni & Yusupa, 2018). Specifically, disaster learning materials will shape disaster mitigation knowledge. Mitigation education needs to be implemented in all schools in Indonesia using various appropriate teaching methods and media.

Instructional media is a crucial component, and its use significantly aids in the effectiveness of message delivery and lesson (Mulyahati et al., 2023). The use of media in the learning process can stimulate interest and motivation and provide encouragement to learners. Recent adolescent learners tend to use electronic media more than print media/books (Aeni & Yusupa, 2018). Suboptimal instructional media can affect students' learning activities and outcomes. If the media used for lesson delivery lacks substance and fails to capture students' interest, the teaching and learning activities become monotonous. There is no active and communicative learning process, leading to passive and less effective student engagement.

Based on initial observations in Geography class XI IPS at SMA 1 Pertiwi Kota Padang, disaster mitigation learning is primarily conducted through lectures and direct practice. The teacher mentioned employing a system of explaining disaster mitigation first and then conducting direct practice with students, as simulations done by teachers were considered more effective and memorable for students. However, over time, with the repetitive teaching method, the teacher also noted a decline in students' enthusiasm for disaster mitigation lessons. Students seemed less eager to participate in direct practical activities, leading to a less cheerful atmosphere in the teaching and learning process.

To prevent monotonous learning, the utilization of communication technology for educational activities, educational technology, and instructional media is necessary. Therefore, the innovation introduced is the use of electronic comic (E-Comic) models in learning. The term "comic" originates from the French word "comique," meaning funny or amusing. Comics, are cartoon forms that express characters and narrate a story sequentially, closely connected with designed images intended to entertain readers (Murtiwik et al., 2022). Comic media has the potential to be preferred by students because the images in comics bring written texts to life. With pictures, lengthy and complex

explanations of reading materials become more understandable and memorable.

In education, comics have the power to motivate students according to the natural attraction humans have to images, capturing and maintaining students' interest. Comics have a specific appeal to school-age children, as students generally feel comfortable combining information in visual and textual forms found in comics. The reasons for the importance of reading comics, including (a) sentences in comics containing more complex words compared to other print media; (b) comics are believed to enhance memory because they are created sequentially, requiring individual memory and imagination; (c) comics introduce unconventional stories; (d) comics are considered a way to learn complex and diverse literature that is easy to understand; (e) comics can be used for character education, as the content influences the reader's behavior; (f) comics facilitate understanding of reading materials; (g) comics create enthusiasm for writing because children enjoy imagination; (h) comics increase knowledge of new words; (i) comics are used for expanding imagination; (j) comics can be used to improve academic performance. Based on these descriptions, it can be concluded that comics are effective when used as a teaching medium.

Consistent with Saputro's opinion in (Murningsih, 2021), comics are a form of learning resource that can help students and replace the teacher's role in both classroom and extracurricular learning activities. Before being used as a tool to enhance student motivation, comics must be developed with consideration for students' needs, a storyline suitable for their age, and compelling content to make the comic medium distinctive and highlight both images and stimulating stories. Comic media can be used in two-way learning processes, as a teaching aid and as a self-learning medium for students. With technological advancements, digital comics have been developed through applications that are considered more effective as they can be embedded in gadgets like mobile phones. The less rigid style of digital comic development is expected to be an enjoyable learning medium for students, motivating them to learn the conveyed content. The light language style of comics is favored by teenagers. Therefore, the developed electronic comic media is intended for high school students.

Relevant research on the development of E-Comic is a study conducted by (Ambaryani & Airlanda, 2017). The study aimed to develop comic media as a learning tool for science subjects for fourth-grade elementary students, specifically addressing physical environmental changes on land. The results of their research showed that: (1) Comic media brings changes to the surrounding

environment based on the discovery learning model. (2) Cognitive learning outcomes showed an increase from 60.54 to 81.08. Another study was conducted by (Linggi, 2016) on the development of comics as an observational text learning medium for seventh-grade students at SMP Pangudi Luhur I Yogyakarta. Based on assessments from subject experts, media experts, and Indonesian language teachers at SMP Pangudi Luhur 1 Yogyakarta, the developed comic media was considered excellent and suitable for field testing without revision. Based on assessments from seventh-grade students at SMP Pangudi Luhur 1 Yogyakarta, the comic received a score of 4.16 with a good category and suitable for observational text learning. Both studies focused on elementary and junior high school levels, while the development of E-Comic for senior high school has not been explored.

Based on the above description, the researcher is interested in conducting research on the "Effectiveness of E-Comic Usage as a Disaster Tsunami Mitigation Learning Media at SMA 1 Pertiwi" as a means of enhancing student knowledge, making disaster mitigation materials effectively and enjoyable to convey.

RESEARCH METHODE

The research method employed in this study is quantitative research because the final results of this research are in the form of numerical data or estimates and are analyzed using statistical programs. It is a quasi-experimental research type, where the research attempts to find the influence of a specific variable on another variable under controlled conditions. Quasi-experimental research includes a control group but may not fully function to control external variables that affect the experiment's implementation. Despite researchers not being allowed to choose subjects for the study, quasi-experimental results are considered meaningful, both in terms of internal and external validity (Meriyati et al., 2020).

The design of this Quasi-Experimental research uses the Non-Equivalent Group Design. This design involves a pretest before treatment for the experimental group (XI IPS 1) and the control group (XI IPS 2). The pretest results will serve as the basis for determining changes and can minimize or reduce selection bias. A post-test at the end of the activity will show the extent of the treatment's effects. The aim of this research is to assess the effectiveness of using E-Comic as a disaster mitigation learning media in SMA 1 Pertiwi by comparing the learning outcomes of the experimental and control classes. The experimental class receives treatment (X) by engaging in disaster mitigation learning activities using E-Comic as a learning media, while the control class

undergoes disaster mitigation learning using conventional media, namely lectures. Subsequently, both classes undergo a post-test.

Table 1.
Research Design

Kelompok	Pre-test	Treatment	Post-test
Eksperimen	O1	X	O2
Kontrol	O3	-	O4

- O1 : pre-test for the experimental group
- O3 : pre-test for the control group
- X : intervention, in this case, the use of E-Comic as a learning media for tsunami disaster mitigation
- O2 : post-test for the experimental group
- O4 : post-test for the control group

RESULT AND DISCUSSION

Based on the Table of Test of Homogeneity of Variance, the significance (Sig.) Based on Mean is $0.022 > 0.05$. Therefore, it can be concluded that the variance of the Post-Test data for the experimental and control classes is not equal or homogenous. Thus, one of the conditions (not absolute) for the independent sample t-test is not met. Consequently, an alternative approach will be employed, utilizing the Mann Whitney U test.

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Hasil Belajar siswa	Based on Mean	5.526	1	58	.022
	Based on Median	2.956	1	58	.091
	Based on Median and with adjusted df	2.956	1	39.629	.093
	Based on trimmed mean	4.259	1	58	.044

Figure 1.

Test Of Homogeneity of Variance

Ranks TEST N Mean Rank Sum of Ranks EXPERIMENT Pre-Test Post-Test E-Comic 44.93 and Post-Test Book 16.07 Total 60 tests. The post-test analysis between the experimental group and the control group, conducted using the Mann Whitney technique, yielded a value of Asymp. Sig. (2-tailed) $0.000 < 0.05$. Thus, it can be stated that the mean rank of the experimental group is higher than that of the control group. With these results, it is indicated that

there is a significant difference between the experimental group and the control group, leading to an increase in the mean rank with a significance of Asymp. Sig. (2-tailed) $0.000 < 0.050$. Therefore, the hypothesis proposed in this study is accepted.

Ranks				
	Kelas	N	Mean Rank	Sum of Ranks
Hasil Belajar Siswa	Post-Test Eksperimen (E-Comic)	30	44.93	1348.00
	Post-Test Kontrol (Buku)	30	16.07	482.00
	Total	60		

Figure 2.

Ranks Test N Mean Rank Sum of Ranks Eksperimen

The primary objective of this research is to assess the effectiveness of E-Comic usage. The researcher conducted an initial test, or pretest, to determine the students' initial abilities. Based on the data obtained and processed using the SPSS program, it was revealed that there is a significant difference in the pretest data between the experimental class and the control class.

This indicates that the research class was selected from a homogeneous population. In such a situation, observing the progress and abilities of students during learning would be very beneficial. The research data shows that there is a difference in students' learning outcomes between those using the E-Comic learning model and those using conventional methods (books). The understanding and learning outcomes of students in the subject of Disaster Mitigation using the E-Comic method are better than those using the conventional method (books).

The development of E-Comic containing disaster mitigation material is presented in an engaging format. This engaging presentation is expected to create a sense of joy in children for learning while playing and motivate them to be more creative. States that learning is effective when done in an enjoyable atmosphere, and if a child has a high interest in learning, the material presented is easily absorbed by the child. E-Comic or digital comics are a new learning medium for children, so children will like this medium, thus motivating them to learn.

In choosing the media used, educators should consider the following: (1) Goals aligned with learning indicators, (2) understanding the characteristics of the media to be used, and (3) comparing with other media to see its suitability for learning goals (Satria & Hastuti, 2021). One of the learning media that can be used according to the characteristics of students in online learning is E-Comic.

E-Comic is a favored medium by elementary school students because reading comics or impressive books can capture the attention of students, stimulating positive thinking and imagination (Ambaryani & Airlanda, 2017). Comics can also evoke curiosity, thereby increasing students' reading interest. Therefore, one way to present material is by using learning media in the form of E-Comic to make it more interesting and easily understood by students (Novalia & Ramadan, 2023)

Based on the presentation of data and the discussion of pre-test experiment results, the experimental class had a pre-test result of 53.40 and a post-test result of 87.10. Meanwhile, the control class had a pre-test value of 51.87 and a post-test value of 61.53. It can be concluded that E-Comic-based learning makes children more interested in learning, resulting in an improvement between the pre-test and post-test conducted.

Table 2.
Learning Outcomes

No	Learning Outcome	Mean
1	Pre-Test Experimental E-Comic	53.40
2	Post-Test Experimental E-Comic	87.10
3	Pre-Test Control Book	51.87
4	Post-Test Control Book	61.53

Discussion

Based on the findings of this research, it can be concluded that the research instrument used has undergone adequate validity and reliability testing. Validity testing using Pearson correlation indicates that each item in the variable has a significant relationship with the total item score. Reliability testing using the Cronbach Alpha method ensures that the instrument is consistent and reliable, especially for items that have been proven valid. This is further supported by previous research (Rosita et al., 2021; Warnilah, 2018) using the same method in reliability testing.

Data analysis shows that the experimental group, using the E-Comic learning method, has significantly different learning outcomes compared to the control group using conventional methods with books. Additionally, homogeneity of variance analysis and the Mann Whitney U test also confirm significant differences between the two groups, with E-Comic showing a more positive influence in the context of disaster mitigation learning.

Therefore, it can be concluded that the effective use of E-Comic can enhance learning outcomes in disaster mitigation compared to conventional methods using books. Previous research also mentioned that the use of E-Comic

has been proven effective in improving learning outcomes (Setyaningsih et al., 2022). Thus, these findings strongly support the research hypothesis, indicating that E-Comic plays a positive and significant role in enhancing the effectiveness of learning in the context of disaster mitigation. The implications of this research can contribute to the development of more innovative and effective learning strategies in the field of disaster mitigation education.

In summary, based on the research findings, it can be concluded that the research instrument used has adequate validity and reliability. Differential learning outcomes indicate significant differences between the experimental and control groups, with E-Comic making a significant positive contribution to improving understanding and learning outcomes in disaster mitigation.

Consistent with the research conducted by (Afriana & Prastowo, 2022) this finding provides strong support for the research hypothesis, stating that E-Comic has a positive and significant role in the context of disaster mitigation learning. The implications of this research include contributions to the development of more innovative and effective learning strategies in the field of disaster mitigation education (Satria & Hastuti, 2021).

Thus, this research not only provides theoretical contributions regarding research instruments but also has practical implications in the development of more effective and relevant learning methods for disaster mitigation education. Through a combination of validity testing, reliability testing, and learning outcome analysis, this research contributes to a deep understanding of the effectiveness of E-Comic in enhancing the quality of disaster mitigation learning.

The development of E-Comic containing disaster mitigation material is presented in an engaging format. This interesting presentation is expected to create a sense of joy in children for learning while playing and motivate them to be more creative. Base on previous research states that learning is effective when done in a pleasant atmosphere, and if children have a high interest in learning, the presented material is easily absorbed by them. E-Comic or digital comics are a new learning medium for children, making them more likely to enjoy this medium and, thus, motivated to learn (Indriasih et al., 2020).

Research conducted by (BatuBara et al., 2021) also reveals that comics can arouse curiosity and increase students' reading interest. Therefore, one way to present material is by using a learning medium in the form of E-Comic to make it more interesting and understandable for students.

Based on the presentation of data and the discussion of pre-test results for the experiment (53.40) and post-test results (87.10), while the control class had pre-test results (51.87) and post-test results (61.53), it can be concluded that E-

Comic-based learning makes children more interested in learning, resulting in an improvement between the pre-test and post-test.

CONCLUSION

Based on the research conducted by the researcher on the Effectiveness of E-Comic Usage as a Disaster Tsunami Mitigation Learning Media at SMA 1 Pertiwi, Padang City, by examining the discussed research results, the field trial results, including the pre-test for the Experimental class (53.40) and the control class (51.87), were observed. Meanwhile, for the Post-test scores, the average learning outcomes for the Experimental class were 87.10, and for the control class, it was 61.53, indicating a significant increase in both Experimental and control class scores compared to the Pre-Test. This shows that E-Comic media can be used by educators as one of the learning media in the school learning process to improve learning outcomes, enhance student understanding, and reduce student boredom compared to using lecture methods alone.

Based on educators' responses to the E-Comic media developed in this study, it was responded to very well. The response was obtained from one educator from the school. Educators provided positive feedback on the effectiveness of this E-Comic media. Additionally, responses were also received from students. This indicates that the developed E-Comic media can be used by both educators and students as one of the learning media in the school learning process.

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