

Systematic Literature Review: Use of Comic Media in Mathematics Learning

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Article Info	ABSTRACT
<p>Keywords: <i>Learning Media, Mathematics Comics, SLR (Systematic Literature Review), Interest in Reading, Problem Solving</i></p>	<p>Learning mathematics does not only depend on what material is taught, but also depends on how the material resources are provided/delivered. The low interest in learning mathematics and the difficulty of understanding formulas means that many children are less interested in studying mathematics. The lack of innovative learning media provided by teachers, the use of cellphones for online games means that students rarely open their textbooks. Choosing the right learning media can be a factor in a teacher's success in carrying out learning activities. The use of comics as a mathematics learning medium is motivated by the low interest in reading and analytical thinking skills among students in Indonesia. One of the factors that can trigger enthusiasm for reading and thinking is designing comic media. Comic learning media is used to increase students' motivation to learn mathematics so that it can ultimately increase students' interest in reading and the level of analytical thinking in solving mathematics problems. This research aims to conduct a literature review related to the effectiveness of using comic media in mathematics learning. The research method used is SLR (Systematic Literature Review). The purpose of SLR is to analyze, find, review, and interpret previous research on the use of learning materials or media in mathematics learning. Data collection was carried out by documenting all articles that had similar research to this research. The journal articles used in this research were 10 national journal articles taken from the last seven years of research conducted by researchers obtained from Dimensions. Based on this research, it was found that comic media in mathematics learning really helps teachers to increase students' interest in reading and problem solving abilities so that it is useful in improving student's analytical thinking abilities.</p>

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INTRODUCTION

Mathematics learning is important to pay attention to and teach to students. The large number of formulas and symbols as well as long, even complicated, solution steps trigger students' low reading literacy in mathematics subjects. Interest in reading books in Indonesia is still considered very low. According to UNESCO data, Indonesian people's interest in reading is very worrying, only 0.001%. This means that out of 1,000 Indonesians, only 1 person is an avid reader.

The Ministry of Communication and Information of the Republic of Indonesia on its official website has also released research results entitled World's Most Literate Nations Ranked conducted by Central Connecticut State University in March 2016, Indonesia was declared ranked 60th out of 61 countries regarding interest in reading, even though in terms of infrastructure assessment to support reading, Indonesia's ranking was above European countries. Meanwhile, PISA or Program for International Student Assessment, an international study that assesses the quality of the education system by measuring learning outcomes that are essential for success in the 21st Century, stated that the PISA results in 2022 regarding reading literacy showed that Indonesia's ranking had risen 5 positions compared to 2018. However, the score obtained shows a decline and Indonesia still ranks

11th out of 81 countries in the data.

Meanwhile, mathematics learning carried out in class only focuses on Teacher explanations, recording calculation results from teacher explanations and reading book sources full of formulas will make students bored/bored in reading their learning resources. Without the use of appropriate reading material sources and learning media according to the material to be taught by the teacher, this results in a teacher not being able to attract the attention of students to like the world of mathematics.

Mathematics is a subject that must be taught at every school level (Damarsari, 2017). Mathematics is a field of study that supports the development of science and technology in this era and in the future (Prasetyo & Hardjono, 2018). Mathematics lessons are not just about numbers, but are much deeper than that (Puspaningtyas, 2019). The achievement of mathematics education can be seen from students being able to complete mathematics learning tasks, students being able to apply the goals of mathematics education in everyday life, applying them, making mathematics an important part of students' lives.

Learning media is one thing that cannot be separated from the learning process. Interesting and practical learning media can influence students' interest in learning and make the learning process more efficient and effective (Parnabhakti & Puspaningtyas, 2020). Apart from that, learning media can also make it easier for educators to convey material to students.

Media in Arabic is an intermediary *وسائط* or messenger from the sender to the recipient of the message. Learning media can be defined as a graphic, photographic and electronic tool for observing, processing and reorganizing information obtained from the teaching and learning process (Agoes Prihanto & Nova Hasti Yuniarta, 2018). According to Arif S. Sadiman et al. (2003:6) in his book "Educational Media, understanding, development and use" states that media is anything that can be used to channel messages from the sender to the recipient so that it can stimulate students' thoughts, feelings, attention and interests in such a way that the process learning happens.

Learning media is used to improve the quality of teaching and learning and as a teacher facility in the teaching process. Learning media can also describe things more realistically and more easily understood by students in the classroom learning process (Masri et al., 2019). Media in the teaching and learning process tends to be defined as graphic, photographic or electronic tools for capturing, processing and reorganizing visual or verbal information. Therefore, teachers need to prepare tools and materials as learning media to support the learning process well and make students more enthusiastic about learning.

Learning media has different levels of quality. Learning media that has good quality must have valid elements (statements in accordance with existing provisions and carried out by validators), practical (easy to use and easy to understand by media users) and effective (able to make students easily understand the content of the material seen from the learning outcomes) (Alfinia Witanta & Inganah, 2019). There are many types of mathematics learning media, for example print media, electronic media, concept map media, teaching aid media. This media was created with the aim of making students active and more motivated in learning mathematics.

Mathematics comics according to Maulana (2009) in Devy Yuliasri Kurnia Putri (2015:26) are comics that contain mathematics subject matter presented descriptively and narratively with the aim of making students more motivated to learn mathematics and optimizing the way the brain works to remember mathematics subject matter.

Comics are one of the reading books that are widely known by the public, from small children to adults (Ula et al., 2019). The images contained in the comic are arranged sequentially to convey information and give an impression of beauty to readers (Cahyo Putro & Setyadi, 2022). The concise

storyline and realistic characters will attract students of all ages. Comics also combine the power of images and writing that are strung together in one storyline which makes information easier to absorb, so that the messages contained in the comic are stored in memory for a long time (Anesia Regita & Gunawan, 2018).

Comic-based learning media is one of the innovative and creative media that continues to be developed as reading material for students. The development of modern technology has made teachers able to evolve to find appropriate strategies, methods and applicable media as learning resources that can improve logical and analytical thinking skills to solve everyday problems related to mathematics. It is hoped that comic-based learning media will be one of the right instruments of choice to help stimulate students to carry out the learning process and increase their literacy and understanding of mathematics.

Comic media, animation media, visual media, and so on are various types of learning media, one of which is according to (Basasi, 2017) a form of graphic (visual) media which emphasizes students' sense of sight in receiving messages conveyed by the teacher and takes the form of stories. is the definition of comic media. Several characteristics of comics include: (a) comics usually consist of various continuous story situations; (b) if the comic has another character, it is usually known so that the power of the comic can be appreciated (c) it is entertaining; (d) readers can immediately identify themselves through the feelings and actions of the main character's character because the story in the comic is about the individual (e) the comic focuses attention on the environment around the people; (f) comics usually include action; (h) making it more lively by using main colors freely; (g) the story in the comic is concise and attracts attention;

The use of comics in teaching should be combined with teaching methods, so that comics can become an effective medium. Comic media is a non-projection language learning medium in the form of writing accompanied by interesting pictures that can be seen and read (Indaryati & Jailani, 2015). It is hoped that comic media can help students understand the contents of a story so that they can convey the contents of the story well (Basis, 2017).

Research conducted by Budiarti & Haryanti (2016) also used comics as a learning medium. From the results of his research, the use of comic media can have a positive influence on students' learning motivation and reading skills. The use of learning media can also improve the quality of the learning process which will ultimately influence analytical thinking. Comics are simple, clear and easy to understand so they are informative and educative media. Research on the development of comic learning media has been carried out by several experts. The use of comic learning media shows positive results and is also practical to apply to students. Several experts concluded that the development of learning media in the form of comics showed a positive response and could increase students' interest in learning and student learning outcomes that were no longer below average (Syahwela et al., nd) and (Gumilang et al., 2019).

In several mathematics journal articles, specifically regarding mathematics learning media, articles that test, develop or produce learning media products are often discussed. Therefore, researchers collected various mathematics learning media, one of which was mathematics comic media. This research aims to determine the effectiveness of using comic media selection in the process of increasing interest in reading and analytical thinking skills for solving students' problems using the research method of studying literature from journals taken in the last seven years.

RESEARCH METHOD

This research uses the SLR (Systematic Literature Review) method. The researcher carried out

this method by identifying, reviewing, evaluating and interpreting all available research. With this method, researchers systematically review and identify journals which in each process follow predetermined steps (Triandini, Jayanatha, Indrawan, Putra, & Iswara, 2019). The data collection process was obtained by reviewing journals then reading, taking notes, and continuing with processing research materials. The research method used is similar to that used by Fauzi and Praadarti (2018).

Based on the stages above, the researcher looked for journal articles with the keyword Systematic Literature Review: Use of comic media in mathematics learning. Data collection was carried out by documenting all journal articles obtained in this research report. The journal articles used in this research were 10 accredited national journal articles obtained from Google Scholar and Dimensions. The selected articles are articles that have similar research and then the articles are analyzed and summarized. The research results were then made into a complete discussion in this article.

RESULTS AND DISCUSSION

The results of the analysis and summary of several documented articles relate to literature studies on the effectiveness of using comic media as a mathematics learning medium as a result of research data included in the literature review. The following will explain the results of research on the effectiveness of Comic Media:

Table 1: Result of Literature Review of Several Journals

No.	Researcher	Research Title and Journal Source	Research result
1	Nurhayati, Aswar, Irfan Arifin	Comics as a Mathematics Learning Media in Elementary Schools. Imagination Journal, 2018.	Designing a Comic for Mathematics learning media that discusses multiplication material, after going through several conceptual stages to find solutions to existing problems, to arrive at a design result that is considered capable of being used as teaching material for multiplication material at elementary school level.
2	Catherine Riza Aprilla	Development of Comic-Based Mathematics Learning Media to Improve Skills Student Problem Solving. Thinking Skills And Creativity Journal (TSCJ), 2020.	Based on the research conducted, comic media was obtained using the ASSURE design model which consists of six stages. Based on the results of observations in class 4 at SD Negeri Sidorejo Kidul 03, data was obtained that class 4 students liked learning with interesting learning media, one of which was comic media. From the results of the analysis of student learning styles, 15 out of 23 students liked comic media. Also, there are 15 students who have a learning style using media, while there are 5 students who may have a

			learning style using media, and 3 students who don't like the learning style using media. The presence of comic media in mathematics learning causes students' interest/enthusiasm for reading and problem solving skills.
3	Aan Putra, Ines Feltia Milenia	Systematic Literature Review: Comic Media in Mathematics Learning. Mathematics Journal, January 2021	From the results of research using the SLR method, it was found that comic media can improve students' problem-solving abilities. Based on the results and discussion of research on the effectiveness of comic media, there were positive responses given by students.
4	Fatinatus Selvia, Athar Zaif Zairozie, Ainol.	Development of Mathematics Comic Learning Media Material on lines and angles for Class VII SMP. Theorems Journal (The Original Research Of Mathematics) Volume 7, Number 1, July 2022.	This research states that mathematics comic media is suitable and practical to use for class VII junior high school students. This can be seen from the results of student response questionnaires in small-scale trials and large-scale trials. Students were very enthusiastic when given the learning media for mathematics comics.
5	Moh. Abdul Shomad and Susi Rahayu	The Effectiveness of Comics as a Mathematics Learning Media. J'THOMS (Journal Of Technology Mathematics And Social Science) 2(2), 2022, 1-5	Based on the literature analysis carried out by the researchers above, it was found that comics are a learning medium that is simple, interesting and easy to understand by students, making it easier for the teaching and learning process and increasing learning motivation and student learning outcomes.
6	Maria Enjelitha Sinaga, Endang M Kurnianti.	"Development of Comic-Based Worksheets in Mathematics Subjects in Class IV Elementary Schools". JPDK volume 4 number 2 2022.	Based on the data that has been analyzed, comic-based worksheets in grade IV mathematics subjects with material on squares and square roots, received the "Very Good" category for use. This data is proven from the results of validation tests by experts, namely media experts, language experts and material experts. Apart from that, this data is also proven by the assessment of class IV teachers and students at SD Yadika 3 in providing responses to the worksheet.

7	Yuliarni, Fatmah, Apriana, Heryati, Nurhayati, Dewi Setyawati, Yusinta Tia Rusdiana.	Utilization of Learning Comic-Based Learning Media for Teachers at Teladan Palembang High School. KKN Education Bulletin, Vol. 5, no. 1, June 2023	This service activity socializes how to develop teaching media, one of which is through comics. Making this comic can be used as an attraction for students' learning, especially in lessons that have quite a lot of material.
8	M. Ruskhan Fauza, Baiduri, Siti Inganah, Rahmad Sugianto, Rani Darmayanti.	The Urgency of the Need for Comics: Design for the Development of Mathematical Media with a Local Wisdom Insight in Medan. Deltha phi: Journal of Mathematics Education, Publications: 06/16/2023	From the research results, it is known that students are interested in manga media as teaching material which is full of local wisdom values for character education. Students' interest in comic learning media as an alternative not only increases their interest in reading, but also their efforts to learn about the noble character of a country's culture through developing learning comics that are imbued with local wisdom.
9	Budi Cahyono, Ahmad Ainur Rohman, Robi'a Ilmi Dzakiyyah, Rina Dwi Setyawati.	Development of E-Comic Learning Media Based on Ethnomathematics and Creative Thinking Ability on MTs Geometry Material. Axiom: Educational Study Program Journal volume 12, No. 2, 2023.	Based on the results of research on the development of ethnomathematics-based e-comic learning media and the ability to think creatively on geometry material at the MTS level, an average validity test score by experts was obtained at 3.38, so it is included in the very valid criteria. 95% of participants in the practicality test stated that the media could be used. In the learning process.
10	Yosi Yasma Rani, Orin Asdarina.	Development of Mathematical Comic-based LKPD to improve students' mathematical problem solving abilities. Phi: journal of Mathematics Education, Vo. 8 Number 1 of 2024.	Based on the validation results by a team of experts, it was found that the validity of the mathematical comic-based LKPD for material and media aspects was 91% and 90% in the very valid category. Based on the trial results, it was found that the practicality of mathematical comic-based LKPD from the results of teacher and student response questionnaires was 87.4% and 86.7% in the very practical category. Therefore, the mathematical comic-based LKPD to improve students' systematic problem solving abilities is valid and practical to be used in the mathematics learning process.

This research shows that comic media not only helps improve problem solving skills, but also motivates students to learn mathematics more enthusiastically and effectively. These results confirm that comic media is one of the effective media and learning materials so that it can be relied on in the context of mathematics education and increases the spirit of reading literacy as well as the development of innovative comic student worksheets (LKPD) which are able to attract students' attention to further deepen their studies. towards mathematics.

From the discussion on the use of comic media as a mathematics learning medium, there are several advantages and disadvantages of comics as a learning medium. As for Advantages of Comic Media as a mathematics learning medium:

- a. Increasing Learning Motivation: Comics are able to attract students' interest through interesting stories and pictures, so they can increase students' learning motivation in studying mathematics which is often considered difficult and boring.
- b. Makes it easier to understand material: Presenting mathematical concepts in the form of visual and narrative stories makes the material easier for students to understand and remember. The images and dialogue in comics help explain complex concepts in a simple and fun way.
- c. Increasing Interest in Reading: With an interesting format, comics can increase students' interest in reading. This is important considering the low interest in reading among Indonesian students. Comics make reading activities more fun and interesting.
- d. Development of Analytical Thinking Abilities: Well-designed comics can stimulate students' analytical thinking abilities. Through stories that require problem solving and analysis, students can develop their critical and logical thinking skills.
- e. Appealing to a Wide Range of Ages: Comics have broad appeal and can be enjoyed by students of all age levels. This makes it a flexible learning medium that can be used at various levels of education.

Disadvantages of Comic Media as a mathematics learning medium:

- a. Limitations on Material that Can Be Presented: Not all mathematical concepts can be simplified and presented in comic form. Some topics that are very abstract or require deep mathematical understanding may be difficult to explain through pictures and narration alone.
- b. Dependence on Design Quality: The effectiveness of comics as a learning medium is very dependent on the quality of the design and creation of the comic itself. Comics that are poorly made can reduce students' understanding and interest in the material being presented.
- c. Requires Additional Resources: Developing and producing quality comics requires a lot of time, effort and money. Teachers may need help from graphic design experts or illustrators to create effective comics.
- d. Lack of Use Outside the Classroom: Students may view comics only as entertainment reading material, rather than as a serious learning tool. This can reduce the effectiveness of comics in improving students' understanding if they are not supported by appropriate teaching methods.
- e. Challenges in Assessment: Assessing student understanding through the medium of comics can be a challenge. Teachers need to develop appropriate assessment tools to ensure that students truly understand the material presented through comics, not just enjoy the story.

CONCLUSION

This study confirms that the use of comic media in mathematics learning has a significant positive impact on students' interest in learning and analytical thinking abilities. Comic media is able to make mathematical material more interesting and easy to understand through descriptive and

narrative presentation. This has been proven to increase students' motivation to learn mathematics as well as their ability to solve mathematical problems. Comics, with their combination of attractive visuals and text, provide an effective way to stimulate reading interest and optimize students' understanding of mathematical concepts.

Research shows that students tend to be more motivated and enthusiastic when using comic media in the learning process. In various studies, students who were given comic-based learning media showed improvements in problem-solving skills and understanding of concepts. Comic media not only helps in conveying complex material in a simpler way, but is also able to maintain students' attention and involvement during the learning process. This proves that comic media is an effective tool for improving the quality of mathematics learning in the classroom.

Even though comic media shows many benefits, its implementation in the classroom still faces several challenges. One of the main obstacles is the lack of knowledge and skills of teachers in designing and using comic media as a learning tool. In addition, adequate support and resources are needed for the effective development and implementation of this media in schools. Collaboration between educators, researchers, and policy makers is essential to overcome these obstacles and ensure that comic media can be optimally integrated into the mathematics curriculum.

Overall, the results of this research provide strong evidence that comic media can be an innovative and effective learning tool/media in mathematics education. With an interesting and easy-to-understand approach, comics can increase students' interest and involvement, as well as strengthen their analytical thinking skills. To achieve maximum benefits, there needs to be proper teacher training and development of quality teaching materials. Thus, comic media can contribute significantly in creating a more enjoyable and effective learning experience for students.

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