(JIML) JOURNAL OF INNOVATIVE MATHEMATICS LEARNING
Volume 8, No. 3, September 2025
P-ISSN 2621-4733
E-ISSN 2621-4741
https://dx.doi.org/10.22460/jiml.v8i3.p28955

THE DEVELOPMENT OF ISLAMIC MATHEMATICS E-COMIC LEARNING MEDIA TO IMPROVE STUDENTS' MATHEMATICS COMMUNICATION SKILLS

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ARTICLE INFO

Article history:

Received Jul 25, 2025
Revised Aug 05, 2025
Accepted Aug 13, 2025

Keywords:

Mathematics
Communication Skills
Electronic Comic
Islamic Mathematics

ABSTRACT

This study aims to improve students' mathematical communication skills. One way to improve students' mathematical communication skills is to develop Islamic-themed Android-based e-comic learning media. E-comics are designed to summarise material and present it in an interesting way. Therefore, this study was conducted by developing an interactive e-comic product that can improve students' mathematical communication skills. This study is a research and development study aimed at describing the validity, practicality, and effectiveness of the Islamic-themed e-comic product. The development model used is ADDIE, which consists of the following stages: analyse, design, development, implementation, and evaluation. The research subjects were 32 students in class VIII of SMPN 1 Rambipuji, along with 2 learning media experts and 2 subject matter experts as validators. The object of this study is the Pythagoras learning media using Islamic-themed e-comics. Questionnaires and surveys were used as tools to collect data. The validation score for the interactive e-comics had an average of 93%, falling into the highly valid category. The practicality of the interactive e-comics had an average of 92.5%, falling into the highly practical category. The effectiveness of the interactive e-comic had a fairly large N-gain score of 0.60, falling into the moderate category. Based on the research results obtained, it was concluded that the Islamic-themed e-comic was highly valid, highly practical, and effective in improving students' mathematical abilities.

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How to Cite:

Mukhlis, M., & Annizar, A.M. (2025). The Development of Islamic Mathematics E-Comic Learning Media to Improve Students' Mathematics Communication Skills. *JIML*, 8(3), 590-599.

INTRODUCTION

Indonesia once again participated in the Trends in International Mathematics and Science Study (TIMSS) with 50 participating countries as members. Indonesia ranked 45th with a score of 397 points. Based on the results of the 2015 TIMSS survey, Indonesia's percentage of mathematical communication skills is still below international standards. According to the TIMSS research results, students' mathematical communication skills are still low, which is reinforced by the reality in schools (Darmawan & Ramlah, 2021). This is in line with the results of research

conducted by Rezi that the average KKM of students is below the qualification in communicating mathematical ideas, including in the very low category (Rezi Ariawan, 2017). The results of research conducted by Hakim show that students' mathematical communication skills scored 66.32% of the ideal score, placing them in the low category (Hakim et al., 2024). Data obtained by the researcher from observations at one public junior high school indicate that the lowest mathematical score was 12.5, the highest was 92, and the average was 59.04. The results of a questionnaire from 32 students about difficulties in learning communication mathematics showed that two students were unable to explain mathematical ideas, situations, and relationships verbally and in writing using real objects, pictures, graphs, and algebra; five students were unable to express everyday events in mathematical language or symbols; five students were unable to listen, discuss, and write about mathematics, seven students were unable to read and understand a written mathematical presentation, five students were unable to make conjectures, construct arguments, formulate definitions and generalisations, and eight students were unable to explain and ask questions about the mathematics they had learned. Based on the results of direct interviews with 32 students, 26 students said that no media was used, resulting in students having difficulty understanding the material and being less communicative in the learning process.

Based on the above data, these issues contradict the objectives of mathematics education. One of the objectives of mathematics education is to help students develop the ability to communicate ideas using symbols, tables, diagrams, or other media to clarify situations or problems, as well as to present a situation in mathematical symbols or models (mathematical communication and representation). The objectives of mathematics learning include developing mathematical communication, using mathematics as a tool for communication, the ability to make connections between mathematical ideas, between mathematical ideas and other intellectual activities, and the ability to make connections between mathematical ideas and other intellectual activities (Qohar & Sumarmo, 2013). Mathematical communication is the ability to express mathematical ideas clearly to peers, teachers, and others through spoken and written language (Annisa et al., 2025). mathematical communication are an important component in learning mathematics because they are a tool for exchanging ideas and clarifying mathematical understanding (Veni Aprilia Dwi Astuti & Yuliani, 2024).

Given the importance of mathematics, particularly in the process of mathematical communication in life, educators must possess good social interaction skills. According to NCTM, mathematical communication skills include students' ability to: 1) Connect real objects, images, and diagrams to mathematical ideas; 2) Explain mathematical ideas, situations, and relationships orally and in writing using real objects, images, graphs, and algebra; 3) Expressing everyday events in mathematical language or symbols; 4) Listening, discussing, and writing about mathematics; 5) Reading with understanding a written mathematical presentation; 6) Making conjectures, constructing arguments, formulating definitions and generalisations; 7) Explaining and asking questions about the mathematics being studied (National Council of Teachers of Mathematics, 2000). According to Baroody in Lim there are at least two important reasons why communication in mathematics learning needs to be a focus of attention, namely (1) mathematics as language; mathematics is not only a tool to aid thinking, a tool for finding patterns, or solving problems, but mathematics is also ‘an invaluable tool for communicating a variety of ideas clearly, precisely, and succinctly,’ and (2) mathematics learning as a social activity; as a social activity, in mathematics learning, interactions among students, as well as teacher-student communication, are important components for nurturing children’s mathematical potential (Lim & Chew, 2007). Communication is considered the means by which teachers and students can share the process of learning, understanding, and doing mathematics (Danny et al., 2024). Therefore, innovative and interactive learning media are needed to

facilitate the learning process, particularly in enhancing students' mathematical communication skills (Vale & Barbosa, 2017).

With the rapid development of technology in various parts of the world, the use of smartphones is increasing every day. Life cannot be separated from smartphones, from social, economic, legal, health, to education. The massive use of Android in everyday life can be utilised by teachers to develop smartphone-supported or Android-based learning (Hendikawati et al., 2019). Development is needed by leveraging these technological advancements to facilitate learning, one of which is by creating learning media with the concept of m-learning (Mobile learning) using smartphones as the development device. According to Irmaya students today also require learning materials beyond textbooks that not only present content but are also accompanied by relevant examples aligned with the lesson material, enabling students to enjoy and understand the material effectively (Irmaya et al., 2024). It has been proven that research conducted by Novita showed the effectiveness of e-comics based on an effectiveness questionnaire of 81.91%, which falls under the 'very effective' category (Amalia Novita, Nizlel Huda, 2022). The effectiveness of the effectiveness test yielded a percentage of 91.43% (Argadinata & Maharani, 2025).

The advancement of technology in the 21st century has both positive and negative impacts. The positive aspect is the development of technological knowledge, while the negative aspect is the erosion of Islamic values. The absence of efforts to reduce the erosion of Islamic values is feared to make the younger generation increasingly forget the Islamic values that serve as their life guidelines, thus requiring an understanding of these Islamic values (Lisnani et al., 2023). Integrating Islamic values and mathematics in education is expected to motivate students and facilitate their understanding of learning concepts, particularly in mathematics, while enabling them to apply Islamic values in their daily lives.

The above issues gave rise to the idea of creating learning media for comparison material by utilising Android smartphone-based technology in mathematics learning at junior high schools by linking it to Islamic values, which was implemented in a study entitled 'Development of Islamic-themed Android-based Mathematical E-Comics for Comparison Material to Improve Students' Mathematical Communication Skills'. The expectation from the development of Android-based mathematical e-comic learning media with Islamic values is that it will be valid, practical, and effective, making it suitable for use in improving mathematical communication skills.

METHOD

The learning media developed is interactive learning media, because E-Comic combines audio, text, images, videos, and explanatory text to provide clear information. This research follows a research and development (R&D) approach, specifically using the ADDIE model, which includes the stages of analysis, design, development, implementation, and evaluation. However, this study focuses on the analysis, design, development, and implementation stages.

In the analysis stage, researchers identify learning problems in schools and seek solutions. The design stage involves organizing learning materials, creating storyboards, and selecting software to create E-Comics. The development stage includes the actual creation of the media, followed by validation and further revisions. Finally, during the implementation stage, the learning media undergoes a trial period with students to assess their responses.

This study involved 32 junior high school students and 2 validators who acted as experts in media and 2 subject matters. The purpose of this study was to develop interactive learning media for the Pythagorean construction e-comic with the help of the Medibang Paint application.

Student response questionnaires and validation sheets were used to gather data. The media and the content were evaluated for soundness using the validation sheets (Sugiyono, 2010). The validity criteria were then compared with the validation findings, which were expressed as percentages outlined Table 1.

Table 1. Validation Result Assessment Criteria

Validity Score	Validity Category
$85{,}01\% < x \leq 100{,}00\%$	Very valid
$70{,}01\% < x \leq 85{,}00\%$	Valid
$50{,}01\% < x \leq 70{,}00\%$	Invalid
$25{,}01\% < x \leq 50{,}00\%$	Very invalid

Students' opinions of the e-comic medium utilized were gathered through the use of a student response questionnaire. The acquired data is first qualitative before being transformed into quantitative form. Following their participation in the e-comic media learning process, students were handed the questionnaire. The criteria listed in Table 2 were then used to convert the answer percentages into data.

Table 2. Practicality Assessment Criteria

Practicality Score	Category
$85{,}01\% < x \leq 100{,}00\%$	Very practical
$70{,}01\% < x \leq 85{,}00\%$	practical
$50{,}01\% < x \leq 70{,}00\%$	Impractical
$25{,}01\% < x \leq 50{,}00\%$	Very im practical

N-Gain is used to measure the effectiveness of the learning process using e-comics. Specifically, N-Gain calculates the relative change between pretest and posttest scores using e-comics by normalizing the increase against the maximum score. Thus, N-Gain provides a quantitative measure of how much students' mathematical communication skills have improved after the learning process. Additionally, N-Gain values can be categorized (high, moderate, low) to indicate the level of learning success. The percentages are listed in Table 3.

Table 3. N-gain Criteria

N-gain	Category
$g \leq 0{,}70$	High
$0{,}30 \leq g < 0{,}70$	Middle
$g \leq 0{,}30$	Low

RESULTS AND DISCUSSION

Results

This research produces a teaching material product in the form of e-comics with Islamic nuances which is prepared to improve students' mathematical communication in learning mathematics on environmental pollution material. The development of Islamic nuanced ecomics uses the ADDIE development model which consists of five stages, namely analyze,

design, development, implementation, and evaluation. The following is a description of the results of the research obtained from each of these stages.

1. **Analyze**

   This stage is carried out an analysis in the form of observations and interviews to obtain information and data in the field. The results obtained are that the implementation of learning takes place the teacher does not involve students actively so that they feel bored more quickly and the use of media that is not Islamic nuances or commonly used media in the form of power points, LKPD, and learning videos sourced from YouTube and has never used e-comics with Islamic nuances in learning.

2. **Design**

   This stage is the preparation or manufacture of e-comic products with Islamic nuances of environmental pollution material that is valid, practical, and effective and easy to understand and includes indicators of mathematical communication. In making the comic itself is organized into five stages, namely: formulation of story ideas, pouring story ideas, inking, coloring, and giving text. Formulating story ideas, the initial design of e-comics is to formulate story ideas and character creation. The story idea is made in the form of a summary which contains the outline of the story. Pouring story ideas, is the stage of channeling story ideas into an image field called sketching. Sketching is done using simple equipment such as paper, pencils, and erasers. Inking is the stage of inking the sketch. Inking is done using ink or markers. However, because comics are packaged in electronic form, the inking stage is carried out using an application, Medibang Paint, where the sketch is transferred to the application first. Coloring, is the coloring stage of the comic. Coloring still uses the Medibang Paint application. Coloring in the application is easier because it contains many colors that can be easily applied directly to comics. Giving text is the stage of filling in the text on the comic.

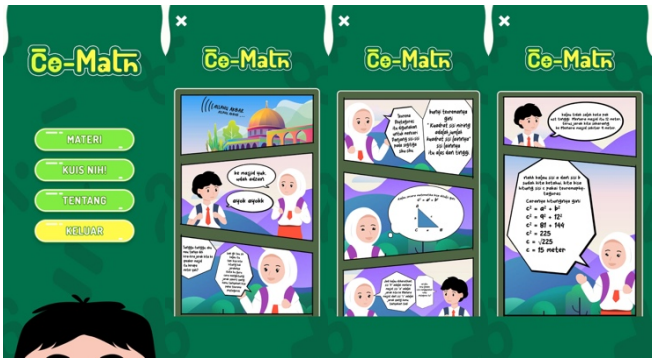

Figure 1. Inking using Medibang Paint

3. **Development**

   This stage is carried out validation of e-comics with Islamic nuances by three validators with the development results and validation results as follows.

Tabel 4. Validation score

Assessed aspect	Observer 1	Observer 2	Observer 3	Average
Content aspect	75%	100%	100%	92%
Material aspect	81%	100%	100%	94%
Serving aspect	94%	94%	88%	92%
Graphic aspect	88%	100%	94%	94%
Average Percentage				93%
Criteria				Very valid

The results of the three validators get an average of 93% which is included in the very valid category. At this stage, e-comics with Islamic nuances have been said to be very valid, but e-comics still get notes by validators that need to be revised because there are still typing errors and the editorial must be replaced with sentences that are easier to understand.

4. Implementation

This trial stage has the aim of measuring practicality in learning. The subjects of this development test were students of class VII D SMP Negeri 1 Rambipuji as many as 32 students. Learning is carried out for two meetings. When learning using e-comics with Islamic nuances, students showed high enthusiasm in discussing, filling in the blanks in the comics and in question and answer sessions and the classroom atmosphere became more fun. E-comics with Islamic nuances are also very easily accessed by students, but some students experience problems because they do not have cellphones. This can be overcome by students who bring cellphones sharing with friends to access Islamic e-comics. Implementation data was obtained through three observers during the teaching and learning activities. The results of the implementation of learning are as follows.

Table 5. Practicality Score

Meeting	Observer 1	Observer 2	Observer 3	Average
Meeting 1	86%	95%	97%	93%
Meeting 2	85%	97%	93%	92%
Average Practically				92,5%
Criteria				Very practical

The average practicality score of the two observers was 92.5% and included in the very practical category.

5. Evaluation

This evaluation stage is divided into two, namely formative evaluation and summative evaluation. Formative evaluation is carried out at each stage of development and summative evaluation is carried out at the end of the implementation of e-comic products with Islamic nuances to determine the effectiveness of the development product. The effectiveness of e-comics with Islamic nuances is measured through student test results in the form of pre-test and post-test which aims to improve students' mathematical communication. In the analysis of the results of the pretest and post-test of mathematical communication, there is a difference in the average value of students as can be seen from Table 6 below.

Table 6. Pre-test and Post-test Results

Data	**Class VIII**	
	Pre-test	**Post-test**
Numbers of student	32	32
Highest score	88	100
Lowest score	25	63
Average score	63,6	83,4
N-gain		**0,64**
Criteria		**Midle**

Based on the data in Table 6 above, it shows that before the use of e-comics with Islamic nuances in learning, the average student pre-test score was 63.6. But after using e-comics with Islamic nuances in the learning process shows the average student post-test score to be 84.3. This shows an increase, the effectiveness of math communication can be known by using the N-gain formula. The results of the N-gain calculation are 0.64 which is included in the medium criteria and there is an increase in learning. Based on the results of this development research, it can be stated that e-comics with Islamic nuances can be applied in learning mathematics because mathematics material, especially pythagoras, is closely related to the phenomena around students so that it requires interesting media to convey it with Islamic nuanced media. Through the application of e-comics, students become active because in the e-comics with Islamic nuances there are parts that need to be filled in by students and there are links to images and videos related to the material, so that students get an activity in learning. During the use of e-comics, students become interested and have high enthusiasm because this Islamic e-comic media is the first time it has been applied. In addition, the interaction between teachers and students during the learning process in the classroom becomes active and learning is not only teacher-centered. However, even though students are enthusiastic and interested, it does not mean that they do not encounter obstacles in the

learning process, especially in operating smartphones and focusing too much on images, resulting in a lot of time being wasted on observing images. This is what causes the N-gain value to be 0.64 or medium criteria.

Discussions

The Islamic-Nuanced mathematical e-comics developed meet the requirements to be highly effective, useful, and valid. Their validity percentage reaches 93% (highly valid) based on expert validation data. These results are comparable to previous research findings, with a validity percentage of 80% or falling into the highly valid category according to (Fitriani et al., 2025). Similarly, research by Isma and Yusuf showed a very high level of validity, with a percentage of 81.7% (Isma & Yusuf, 2025). The student response survey produced findings for the practicality test, which was classified as practical with a percentage of 92.5%. In line with the practicality test results of 87.5%, which falls into the highly practical category (Rahayu et al., 2022). the same results with a percentage of 82.5 (very practical) were obtained by (Siregar et al., 2019). Based on the results of the Pythagorean theorem test, the effectiveness of the Islamic-themed math e-comic was evaluated in addition to its validity and usefulness. An average percentage of 64% was achieved based on student test scores, placing them in the effective category. This study differs from previous studies, which only measured validity and practicality (Mayani, 2022). Basir et al. did the same, with their study only reaching the practicality phase (Mochamad Abdul Basir et al., 2020). This learning module can be used as intended by using these three criteria as a guide. Students also understand that some mathematical concepts, especially the Pythagorean concept, can be combined with Islam.

The Pythagorean theorem, which includes the front, slant, and front sides, is taught in Islamic-themed digital comics. In addition to being a learning resource, this medium has unique characteristics that connect the content with Islamic aspects or the subject matter being studied. Researchers selected a field of study widely used in society. Through this method, understanding the Pythagorean concept becomes more than just memorising formulas and solutions; it becomes a discovery that can be used as added value in the future. In addition to understanding Pythagoras' content, students can gain an understanding of ethnomathematics, its relationship to the subject being studied, and the benefits of knowing this thanks to this research. This is a new idea or breakthrough that will inspire students and make the learning process more interesting. It also eliminates students' negative perceptions of Pythagoras as a difficult concept to understand.

Islamic Nuenced mathematical e-comics are the result of research in the development of educational media. It is hoped that students will find it easier to understand the concepts presented in these Islamic-themed electronic mathematical comics. Students are required to complete a number of practice questions that require the use of diagrams in the learning module. Essentially, teaching the Pythagorean Theorem using this learning module is engaging and may spark new ideas.

CONCLUSION

This research is included in development research. The product developed is an e-comic with Islamic nuances with the content of mathematics subject matter on environmental pollution. The development model in this research is ADDIE which has five stages namely analyze, design, development, implementation, evaluation. This study aims to test the validity, practicality, and effectiveness of e-comics with Islamic nuances. Based on the results of the study, it can be said that e-comics with Islamic nuances get very valid, very practical, and quite effective results so it is feasible to be applied in mathematics learning in order to improve students' scientific literacy. The results of this study can be used for reference in carrying out

similar research but using different variables, materials, or research subjects. E-comics with Islamic nuances in the process of learning mathematics can be used as an alternative learning media because e-comics with Islamic nuances can be accessed anytime anywhere with electronic media such as smartphones, laptops, and other electronic devices. Researchers also hope that Islamic e-comics media can be tested in a wider test involving more students.

ACKNOWLEDGMENTS

This research was supported by funding from the Ministry of Religious Affairs of the Republic of Indonesia through the UIN Kiai Haji Achmad Siddiq Jember. The author expresses his appreciation for this support, which made this research possible.

REFERENCES

Amalia Novita, Nizlel Huda, R. J. (2022). Jurnal PEKA (Pendidikan Matematika). *Matematika*, *05*(02), 90–104. https://doi.org/10.37150/jp.v8i2.3174.Copyright

Annisa, D. P., Kadarisma, G., & Afrilianto, M. (2025). Literature Review: The Effectiveness of The Realistic Mathematics Education Approach to Improve Students Mathematical Communication Skills. *(Jiml) Journal of Innovative Mathematics Learning*, *8*(1), 12–21. https://doi.org/10.22460/jiml.v8i1.23237

Argadinata, A., & Maharani, H. R. (2025). *Union : Jurnal Ilmiah Pendidikan Matematika E-module based on ethnomathematics comics with the ICARE model to improve students ' mathematical representation skills*. *13*(1), 146–166. https://doi.org/10.30738/union.v13i1.19114

Danny, F., Jaenal, E., Fauzy, A., Sugandi, A. I., & Afrilianto, M. (2024). The Implementation of Geogebra-Assisted Discovery Learning Approach Towards Mathematical Communication Ability of Vocational Students. *(Jiml) Journal of Innovative Mathematics Learning*, *7*(4), 383–392. https://doi.org/10.22460/jiml.v7i4.22205

Darmawan, S. M., & Ramlah. (2021). Analisis Kemampuan Pemecahan Masalah Matematis dalam Menyelesaikan Soal TIMSS Berdasarkan Tahapan Polya. *Jurnal Maju*, *8*(2), 283–292.

Fitriani, N., Ronny, R. T., Siliwangi, I., Terusan, J., & Sudirman, J. (2025). *THREE-DIMENSIONAL SHAPE USING E-COMIC*. *8*(2), 211–223.

Hakim, F., Fitriani, N., & Nurfauziah, P. (2024). Peningkatan Kemampuan Komunikasi Matematis Siswa Kelas VIII di MTSN 04 KBB Menggunakan Model Pembelajaran Discovery Learning Pada Materi Lingkaran. *Jurnal Pembelajaran Matematika Inovatif (JPMI)*, *7*(2), 435–444. https://doi.org/10.22460/jpmi.v7i2.22038

Hendikawati, P., Zahid, M. Z., & Arifudin, R. (2019). Android-based Computer Assisted Instruction development as a learning resource for supporting self-regulated learning. *International Journal of Instruction*, *12*(3), 389–404. https://doi.org/10.29333/iji.2019.12324a

Irmaya, N., Syahputra, H., & Lubis, A. (2024). Development of Mathematics E-Comic Media Based On Problem Based Learning To Improve The Problem Solving Ability And Learning Interest of Students of Muhammadiyah Private Junior High School 16 Lubuk Pakam. *Mathline : Jurnal Matematika Dan Pendidikan Matematika*, *9*(3), 739–754. https://doi.org/10.31943/mathline.v9i3.665

Isma, N., & Yusuf, M. (2025). *The Influence of the Implementation of Extracurricular Activities of the Islamic Propagation Agency on the Practice of Religious Worship at Mutia Rahma Bulu Cina Middle School , Hamparan Perak District*. *5*(1), 211–215.

https://doi.org/10.30596/jcositte.v1i1.xxxx

Lim, C. S., & Chew, C. M. (2007). Improving Mathematical Communication Ability and Self Regulation Learning of Junior High Students by Using Reciprocal Teaching. *Journal on Mathematics Education*, *4*(1993), 59–74. http://www.criced.tsukuba.ac.jp/math/apec/apec2008/papers/PDF/11.LimChapSam_Malaysia.pdf

Lisnani, Putri, R. I. I., Zulkardi, & Somakim. (2023). Web-based realistic mathematics learning environment for 21st-century skills in primary school students. *Journal on Mathematics Education*, *14*(2), 253–274. https://doi.org/10.22342/jme.v14i2.pp253-274

Mayani, S. (2022). Pengembangan Modul Matematika Dengan Model Kumon Berbasis Cofi (Comik Fiqih) Pada Materi Perbandingan. *Holistic Science*, *2*(1), 43–56. https://doi.org/10.56495/hs.v2i1.48

Mochamad Abdul Basir, Kurnia Vera Alif Hazira, & Imam Kusmaryono. (2020). *PENGEMBANGAN MEDIA ISLAMIC MATH COMICS DALAM MENINGKATKAN PEMAHAMAN MATEMATIS DAN KARAKTER SISWA*. *9*(3), 842–850.

National Council of Teachers of Mathematics. (2000). Principles and Standards for School Mathematics. In *Sustainability (Switzerland)* (Vol. 11, Issue 1). http://scioteca.caf.com/bitstream/handle/123456789/1091/RED2017-Eng-8ene.pdf?sequence=12&isAllowed=y%0Ahttp://dx.doi.org/10.1016/j.regsciurbeco.2008.06.005%0Ahttps://www.researchgate.net/publication/305320484_SISTEM_PEMBETUNGAN_TERPUSAT_STRATEGI_MELESTARI

Qohar, A., & Sumarmo, U. (2013). Improving mathematical communication ability and self regulation learning of yunior high students by using reciprocal teaching. *Journal on Mathematics Education*, *4*(1), 59–74. https://doi.org/10.22342/jme.4.1.562.59-74

Rahayu, N. W. G. W., Suparta, I. N., & Parwati, N. N. (2022). Pengembangan Media Pembelajaran E-Komik Berorientasi Problem Based Learning untuk Meningkatkan Pemahaman Konsep Aritmatika Sosial. *Jurnal Teknologi Pembelajaran Indonesia*, *12*(1), 2614–2015.

Rezi Ariawan, H. N. (2017). 228883488. *THEOREMS (The Original Research of Mathematics)*, *1*, 82–91.

Siregar, N., Suherman, S., Masykur, R., & Ningtias, R. S. (2019). Pengembangan Media Pembelajaran E-Comic Dalam Pembelajaran Matematika. *Journal of Mathematics Education and Science*, *2*(1), 11–19. https://doi.org/10.32665/james.v2i1.47

Sugiyono. (2010). Metode penelitian kuantitatif kualitatif dan R&D. In *Penerbit Alfabeta*.

Vale, I., & Barbosa, A. (2017). The Importance of Seeing in Mathematics Communication. *Journal of the European Teacher Education Network*, *12*(July), 49–63.

Veni Aprilia Dwi Astuti, & Yuliani, A. (2024). The Effect of Habits of Mindo n Junior High School Students' Mathematics Communication Ability. *(Jiml) Journal of Innovative Mathematics Learning*, *7*(4), 374–382. https://doi.org/10.22460/jiml.v7i4.21675