
IMPLEMENTATION COMIC LIFE LEARNING MEDIA FOR CLASS VII TO IMPROVE STUDENTS' MATHEMATICAL COMMUNICATION AND MATHEMATICAL DISPOSITION ABILITY

Anggie Munthia Safitri¹, Euis Eti Rohaeti², Wahyu Hidayat³

¹Institut Keguruan dan Ilmu Pendidikan Siliwangi, JL. Terusan Jenderal Sudirman, Cimahi, Indonesia.
anggiemunthias@gmail.com

²Institut Keguruan dan Ilmu Pendidikan Siliwangi, JL. Terusan Jenderal Sudirman, Cimahi, Indonesia.
e2rht@ikipsiliwangi.ac.id

³Institut Keguruan dan Ilmu Pendidikan Siliwangi, JL. Terusan Jenderal Sudirman, Cimahi, Indonesia.
wahyu@ikipsiliwangi.ac.id

ARTICLE INFO

Article history:

Received Jun 15, 2021

Revised Jun 23, 2021

Accepted Jun 25, 2021

Keywords:

Learning Media
Comic Life
Communication Ability
Mathematical Disposition

ABSTRACT

The purpose of this research is to see how effective the learning media that have been designed are. The method used in this research stage is development research, in which learning media based on the Comic Life assisted set materials are developed. This Study included 54 students from Bandung and 114 students from Ngamprah Subdistrict from the Junior High School association VII grade level. In the development of media, there are four stages of research namely define; design; develop; disseminate. The stage result in an average data validation of the material expert of 76.3% for the first stage and 80.8% for the second stage. Stage I validation findings were 53.3%, stage II validation was 74%, and stage III validation was 81%. Student replies of 76% and instructor responses of 78% revealed the findings of the validation in limited trials and broad trials. Meanwhile, 79.5% of student responded positively during product testing. The level of efficacy of learning media utilizing Comic Life is attained with an N-Gain of 0.34, implying that the level of effectiveness of Comic Life assisted learning is quite effective. According to the findings of the mathematical communication and disposition exam, students who study using the Problem Based Learning approach with Comic Life have a better-mathematical abilities than those who learn conventional learning. In terms of mathematical disposition, it can be determined that students who utilize the Comic Life assisted Problem Based Learning technique have a better mathematical disposition than those use conventional learning. This development research is based on the learning design produced and the characteristics of students.

Copyright © 2021 IKIP Siliwangi.

All rights reserved.

Corresponding Author:

Anggie Munthia Safitri,
Department of Mathematics Education,
Institut Keguruan dan Ilmu Pendidikan Siliwangi,
Jl. Terusan Jend. Sudirman, Cimahi, Indonesia
Email: anggiemunthias@gmail.com

How to Cite:

Safitri, A.M., Rohaeti, E.E., & Hidayat, W. (2021). Developing Learning Media for Class VII SMP Using Comic Life to Improve Students Communication Ability and Mathematical Disposition. *JIML*, 4(2), 96-108.

INTRODUCTION

The application of technology in the field of education is critical to be implemented and developed, as it can have a significant impact on the development of Science and Technology (IPTEK) in a variety of way. Science and technology are rapidly progressing, resulting in applications that are simple to use and deploy. Individuals, processes, ideas, and innovations are all part of integrated process education technology, which is used to study problems, apply, assess, and manage solutions to problem that arise in various facets of human existence (Purba et al., 2020). According to the findings of numerous research education is a predictor of a country's glory (Aslamiyah et al., 2019). Similarly, in Indonesia, the adoption of technology in education appears to be moving at a breakneck pace. Furthermore, given the global situation created by the Covid-19 pandemic, all actions in different aspect, as well as the scope of education in Indonesia, must be switched at home. In Indonesia education, educators are needed to generate innovations as well as technological adaptations to enhance learning to fulfill learning goals at all levels, from elementary to high school. Students must be prepared to adapt to the learning system during the Covid-19 pandemic, including the production of learning material, in addition to educators.

Learning media has a review function that allows users to select the material to be studied and provide feedback (Fadli & Hakiki, 2020). The teaching and learning process would not be complete without the use of learning material (Pakpahan et al., 2020). Furthermore, learning media is a tool that educators require in the learning process in order to facilitate the delivery of learning objectives (Nugraheni, 2017). Learning media, according to Zayyadi, Supardi, and Misriyana (2017), are approaches used in teaching and learning activities to make the learning interaction process between educators and the rest of the class more effective and efficient. Furthermore, one of the most important components that might influence student learning outcomes is learning media; through media, learning messages can be communicated in accordance with learning objectives. The development of learning media, one of which is the use of the Comic Life, is an example of education related innovation.

Mathematical comics are a learning media whose designs are similar to those of comic books in general, and which help pique students' interest in learning mathematics (Ramadhani, 2019). Comic books also include a variety of images, stories, and messages for their readers (Wijayanti et al., 2018). Contrary to popular belief Manalu et al., (2017) comics are defined as a type of image tale that consists of a sequence of stories, some of which are hilarious. Comics are a visual communication learning media used to transmit instructional messages, with the learning context referring to the communication process between students and learning resources (Ntobuo et al., 2018). By establishing a learning environment that may enhance students' curiosity, comics can assist learning objectives such as increasing students' verbal and writing communication abilities, cultivating perseverance, and creativity (Fadella & Prabowo, 2018).

Learning activities become more effective and engaging when learning media are organized according to the learning topic. As a result, we require media that can be developed, directly viewed, heard clearly, and understood by users (Nida et al. 2017). Teachers can employ a variety of learning resources, including comic books (Sari et al. 2016). Students are more interested in reading texts accompanied by graphics with a clear and ordered storyline so that they are easy to recall when utilizing comics as a learning media (Wahyuningsih, 2012). The collected comics include visual stories as well as educational messages for those who read them (Wijayanti et al. 2018). Comics, according to Manalu et al. (2017), are illustrated stories that incorporate numerous events that are serialized, sometimes amusing. In a creative form, comics also blend writing and picture (Wijayanti et al., 2018). Comic life is the comics utilized in the learning process. In Comic Life, various designs are tailored to the design needs

as well as the desire to learn. Students are urged to use Comic Life learning media to improve their cognitive abilities, one of which is mathematical communication skills. Comic life media can be utilized in a two-way learning process, first as a teaching aid and then as a self-contained learning media that affect students' mathematical communication skills (Apriliana et al., 2018).

The way students express and interpret mathematical ideas orally and in writing, through drawings, tables, diagrams, formulas, or demonstrations is known as mathematical communication (Hodiyanto, 2017; Putri et al., 2017). Furthermore, communication is an important aspect of mathematics since it allows people to exchange ideas and equalize understanding (Azmi, 2017). The communication phases that occur, according to Hidayat & Sumarmo (2013), assist students in constructing the flow of mathematical stages and preparing generalizations.

It is accompanied with emotive components, notably mathematical disposition, in addition to communication skills. Because it correlates with mathematical communication concepts that support curiosity, foster interest in learning, and confidence in problems solving, mathematical disposition is important to apply to teaching and learning activities in the form of efforts to improve Hard Skills and Soft Skills (Hendriana et al., 2017). In current education, where position has a significant impact on developing mathematical communication, disposition is also closely associated (Gabriel et al., 2018). Individuals with a dispositional personality will display conduct that is focused on solving current difficulties while also wishing to find additional answers (Yustiana et al., 2021). The way students ask and answer questions, contribute mathematical concept, work in groups, and problems solving all affect their mathematical disposition (Hutajulu et al., 2019).

This study intends to design a Comic Life assisted learning media to improve communication skills and mathematical disposition of seventh grade Junior High School students, based on the explanation. According to Pritandhari (2016), comic learning media consists of visuals or text that construct a story based on the content being studied. Students will be more likely to read if media is created with appealing stories and exhibits. When read comic books without realizing it, they are indirectly studying math.

METHOD

The method used in this research stage is development research, in which learning media based on the Comic Life assisted association material are developed. With a final output in the form of Comic Life learning media based on material from the Junior High School Association VII grade level. This study included 54 students from Bandung Regency and 114 students from Ngamprah Subdistrict. The following flow diagram depicts the media development process:

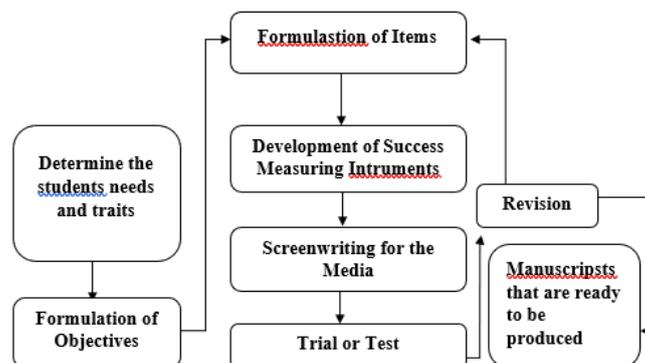


Figure 1. The media development approach

The media development approach in Figure 1 is organized according to Thiagarajan (1974) stages of study. There are four stages of research:

1. Define
2. Design
3. Develop
4. Disseminate

The research included media professionals and material specialist as validators for the development of learning media that the research did at this level of development. The media evaluation will take the form a questionnaire, which will be evaluated qualitatively and quantitatively afterward.

The findings of the pretest, posttest, and student answers in the use of learning media throughout learning can be used to determine the level of efficacy of the learning media generated (Winarto & Yuniarta, 2018). In table 1, the following calculations are organized into categories:

$$N \text{ Gain} = \frac{\text{posttest score} - \text{pretest score}}{SMI - \text{pretest score}}$$

Table 1. Category of Gain

Gain Score	Category
$G \geq 0.7$	High
$0.3 \leq G < 0.7$	Medium
$G < 0.3$	Low

In addition to determining the effectiveness of learning media, responses from teacher and students are required to determine how learning media are produced. The table below shows the instructor and student replies.

Table 2. Responses from The Teacher and Students

Score	Category
86-100	Very Good
75-85	Good
56-70	Quite Good
41-55	Enough Good
25-40	Not Good

Modification Riduwan (2013)

RESULTS AND DISCUSSION

Results

This research produced in learning media products for Class VII Junior High School students based on set materials, which were created in collaboration with Comic Life. Date was collected in the form of quantitative date, such as test results for students' communication

skills and mathematical proclivities, as well as qualitative data, such as teacher and student questionnaires on learning media. The limited trial took place in one school, the wide trial took place in three schools in various locations, and the product test took place at SMPN 1 Ngamprah. The four stages of development are described as follows, based on Thiagarajan (1974) stages of development:

a. Define

To transfer the increase in learning efficiency in the production of learning media, the researcher first analyzed the demands and characteristics of student at SMPN 1 Ngamprah. Facts and alternative problem resolution are given in the initial analysis to make determining the initial stages for generating the proper learning media easy. It also examines the topics taught to establish the content of the learning media that will be generated throughout the Covid-19 pandemic Online learning. In addition, researchers are developing materials that are specifically matched to the learning objectives.

b. Design

The design of learning media to be used in learning the set subject is the next step. This stage entails creating a mathematical communication test instrument to measure the pupils' initial abilities as a post activity evaluation. For the final product distribution plan, select learning media that are appropriate for the topic to be taught and the characteristics of students. Adapt the display format to the learning material being utilized in the form of learning content, select appropriate learning methodologies and resources; and practice presenting topics using prepared learning media. It is the goal of this stage to compile learning media in accordance with be content framework of the define stage analysis result. The design of learning media created with Comic Life is seen below.



Figure 2. Cover of Comic Life

Figure 1 shows the cover of Comic Life, which identifies the material in the comic about the association. Researchers adjusted the Comic cover based on information from media expert validators.

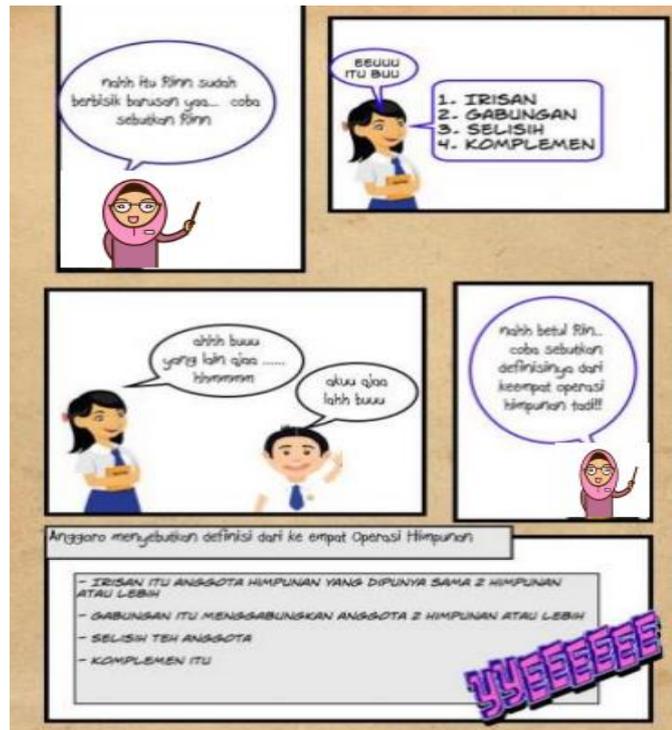


Figure 2. Learning Dialogue

The details of the learning dialogue between the teacher and discussion friends discussing various set operations are shows in Figure 2.



Figure 3. Internet Based Learning Content

Students can study the set material being covered in Figure 3 by using the teacher web link or scanning the barcode mentioned on the Comic Page.

c. Develop

This research stage is a critical component of the development research that will result in learning media products. Where material specialist and media professionals initially validated the learning media. Stage 1 findings reveal a 53.3% for the quite valid category, stage 2 results of 74% for the valid category, and stage 3 results of 81% for the very valid category. The following table the result for the validity of media experts:

Table 3. Results of Media Expert Validation

	% of the vote	Category
Validation (Stage 1)	53.3%	Quite Valid
Validation (Stage 2)	74%	Valid
Validation (Stage 3)	81%	Very Valid

Table 3 shows the percentages of stage 1 and stage 2 validation with these categories. Based on this data, it can be concluded that the product generated must be altered before being tested. After going through the media expert revision step, a highly valid percentages were achieved, allowing the product to be built to be evaluated in a predetermined class. The following are the outcomes of material expert validation:

Table 4. Results of Material Expert Validation

	% Of the vote	Category
Validation (Stage 1)	76.3%	Valid
Validation (Stage 2)	80.8%	Valid

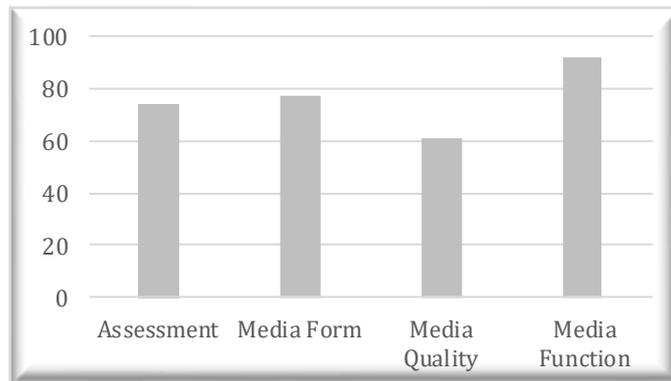
In addition to the validation of media experts, the researchers supplied answer questionnaires on the media generated to teacher and students in restricted and broad trials during the research phase. Table 4 contains the following information about instructor and student replies.

Table 5. Teacher's Response

Aspect of Evaluation	Percentage	Category
Learning	80%	Good
Media Form	75%	Good
Media Quality	67%	Passably
Media Function	90%	Very Good

Table 5 shows the teacher's response to the limited and broad trials, which averaged 76% with good category. There are student responses in addition to the teacher's response, which are listed in table 4 below:

Table 6. Student Responses



In table 6, the percentage of the learning aspect assessment is 74%, the media form is 77%, the media quality is 61%, and the media function is 92%. The category was good, with a substantial percentage of the average student response in the limited trial and a while trial of 76%. The responses of teachers and students serve as a standard for revision for the next stage of development, product testing. The following are the statement from the student response questionnaire:

Table 7. Student Response Questionnaire Statement

No	Statement
1	Life in Comics is depicted in a visually appealing manner.
2	In the long run, Comic Life may make learning easier.
3	Students' ability to use Comic Life in their learning process.
4	Comic Life is a game that allows you to learn while having fun.
5	Both within and outside the Classroom, Comic Life can be employed.
6	Learning utilizing learning media, such as Comic Life, can improve the spirit of learning.

Sources: 2020 Research

d. Disseminate

After completing the three rounds of research and receiving feedback from teachers and students on the learning media generated, the final stage is to disseminate it. The learning media, which was designed in the form of Comic Life and refined by media specialists, was then evaluated in class VII SMPN 1 Ngamprah to assess students communication skills and mathematical disposition. The following table shows the results of the communicative ability test.

Table 8. Test Results for Communication and Mathematical Disposition

	Kolmogorov – Smirnov		
	Statistic	df	Sig.
Pretest for Communication	0.146	32	0.081
Posttest for Communication	0.214	32	0.001

Pretest for Disposition	0.155	32	0.048
Posttest for Disposition	0.109	32	0.200

Because both the communication and mathematical disposition tests aren't normally distributed, the next step is to use a non-parametric test, such as the Mann Whitney test. The following table contains data:

Table 9. Compare and Contrast Two Means

	Mann Whitney	Sig.	Paired Test	
			95% Confidence Interval of The Difference	
			Lower	Upper
Communication	0.236	0.000	-1.25	-1.013
Disposition	(1-tailed)	0.037	-6.137	0.295

The value of Sig. in Table 9 indicates that students who study using the Problem Based Learning approach with Comic Life have a better mathematical communication ability than those who learn using conventional learning. In terms of mathematical disposition, it can be determined that students who utilize the Comic Life assisted Problem Based Learning technique have a better mathematical disposition than those use conventional learning. Data is acquired from the student's pretest and posttest as well as the response questionnaire during the learning process to establish the level efficacy of the learning media as measured by N-Gain value. The following table summarizes the findings.

Table 10. N-Gain

Test	Score Total	Average	N-Gain	Category
Pretest	221	6.9	0.34	Medium
Posttest	590	18.4		

Table 10 demonstrates that the N-Gain is 0.34 with moderate requirements. According to the N-Gain category, the level of efficacy of learning media including Comic Life is moderate, implying that the development of Comic Life learning media is quite effective and may be utilized in a variety of formal and non-formal education scenarios.

Discussions

The usefulness of the learning media designed in the form of Comic Life has been tested, and the results reveal that the media is quite effective in the teaching and learning process when the Covid-19 pandemic is still occurring. Many students encountered challenges in understanding learning materials during online learning, owing to a lack of learning resources, a less conducive learning environment, and other factors. These issues are caused by psychological and other variables that affect kids who are having difficulty studying (Masroza, 2013). Vaughn et al., (2013) further state that not all students' learning difficulties

in the mathematics learning process are due to a lack of information; other variable includes memory issues, a lack of numeracy abilities, and trouble interpreting mathematical symbols. Teachers must of course use learning tools that make it easier for pupils to study to lessen the obstacles they confront. Learning to be less monotonous and bored in the process of graphing the content, presenting varied pictures aimed at generating a pleasant learning atmosphere are just a few of the numerous benefits of using media in the teaching and learning process (Sanjaya, 2012). The focus of this instructional media remains on the students. The findings of Ali (2014) research mostly describe procedural abilities, with pupils paying little attention to how to explain solutions using mathematical language or articulating ideas in the form of visuals. Students will receive a brief explanation of the date, as well as facts regarding comprehension in the process and application of mathematics, if there is no communication during the learning process (Romberg, 1989). In addition to communication, which is critical in the learning process, disposition must also be used during the learning process. According to Kusmaryono et al., (2019) developing a mathematical disposition is critical for improving cognitive, emotional, and psychomotor abilities. Individuals with a strong mathematical disposition and high requirements will have a positive attitude, be hardworking, responsible, achieve great things, and may assist others in achieving their goals (Widyasari et al., 2016). In order to determinate the level of student understanding, the teacher must know the response or replies of pupils to the learning presented during class (Panjaitan & Marlina, 2016). Students responses can also be evident in their behavior, which is determined by their answers and the environment response (Arini & Lovisia, 2019).

CONCLUSION

This development research is based on the learning design produced and the characteristics of students, and it's based on the results of research on the use of Comic Life learning media to improve students' mathematical communication and mathematical disposition. To encourage students' interest in learning, educators should use and produce creative and new learning media. The use of various mathematical abilities to be varied is therefore proposed for further investigation, which can benefit research in developing learning media.

ACKNOWLEDGMENTS

Thank you to the person who those to publish my article. First, I'd like to thank SMPN 1 Ngamprah for assisting me with my study. Second, validators are material experts and media specialists who assist in the validation of developed learning media. Finally, I want to express my gratitude to everyone who helped with the research.

REFERENCES

- Ali, S. (2014). Efektifitas Strategi Pembelajaran Kooperatif Tipe Think-Talk-Write (TTW) Terhadap Kemampuan Komunikasi Dan Disposisi Matematis Siswa. *Jurnal Pendidikan Dan Keguruan*, 1(2), 21–29.
- Apriliansa, E., Fikriani, T., & Nurva, M. (2018). Pengembangan Bahan Ajar Matematika Berbentuk Komik Untuk Meningkatkan Kemampuan Komunikasi Matematis Siswa Kelas VII SMPN/MTSN. *Jurnal Pendidikan Matematika*, 2.
- Arini, W., & Lovisia, E. (2019). Respon Siswa Terhadap Media Pembelajaran Alat Pirolisis Sampah Plastik Berbasis Lingkungan Di SMP Kabupaten Musi Rawas. *Thabiea : Journal of Natural Science Teaching*, 2(2), 95–104. <https://doi.org/10.21043/thabiea.v2i2.5950>
- Aslamiyah, T. A., Setyosari, P., & Praherdhiono, H. (2019). Blended Learning dan Kemandirian Belajar Mahasiswa Teknologi Pendidikan. *JKTP- Jurnal Kajian Teknologi*

Pendidikan, 2(2), 109–114.

- Azmi, M. P. (2017). Asosiasi Antara Kemampuan Analogi Dengan Komunikasi Matematik Siswa SMP. *Al-Jabar : Jurnal Pendidikan Matematika*, 8(1), 91. <https://doi.org/10.24042/ajpm.v8i1.902>
- Fadella, E. F., & Prabowo, A. (2018). Keefektifan Problem Based Learning Berbantuan Komik Matematika Terhadap Kemampuan Pemecahan Masalah dan Rasa Ingin Tahu Siswa. *Prisma Prosiding Seminar Nasional Matematika*, 1, 77–86.
- Fadli, R., & Hakiki, M. (2020). Validitas Media Pembelajaran Interaktif Berbasis Android Pada Mata Pelajaran Komputer Dan Jaringan Dasar Di Sekolah Menengah Kejuruan. *Jurnal Inovasi Pendidikan Dan Teknologi Informasi*, 01(01), 9–15. ejournal.stkip-mmb.ac.id
- Gabriel, F., Signolet, J., & Westwell, M. (2018). A Machine Learning Approach to Investigating The Effects of Mathematics Dispositions On Mathematical Literacy. *International Journal of Research & Method in Education*, 41(3), 306–327.
- Hendriana, H., Rohaeti, E. E., & Sumarmo, U. (2017). Hard Skills dan Soft Skills Matematik Siswa. In *Bandung: Refika Aditama*.
- Hidayat, W., & Sumarmo, U. (2013). Kemampuan Komunikasi dan Berpikir Logis Matematik serta Kemandirian Belajar. *Delta-Pi: Jurnal Matematika Dan Pendidikan Matematika*, 2(1), 1–14.
- Hodiyanto, H. (2017). Pengaruh Model Pembelajaran Problem Solving Terhadap Kemampuan Komunikasi Matematis Ditinjau Dari Gender. *Jurnal Riset Pendidikan Matematika*, 4(2), 219–228.
- Hutajulu, M., Wijaya, T. T., & Hidayat, W. (2019). The Effect Of Mathematical Disposition And Learning Motivation On Problem Solving: An Analysis. *Infinity Journal*, 8(2), 229. <https://doi.org/10.22460/infinity.v8i2.p229-238>
- Kusmaryono, I., Suyitno, H., Dwijanto, D., & Dwidayati, N. (2019). The Effect Of Mathematical Disposition On Mathematical Power Formation: Review Of Dispositional Mental Functions. *International Journal of Instruction*, 12(1), 343–356. <https://doi.org/10.29333/iji.2019.12123a>
- Manalu, M. A., Hartono, Y., & Aisyah, N. (2017). Pengembangan Media Komik Matematika Berbasis Nilai Karakter pada Materi Trigonometri di Kelas X SMA Negeri 1 Indralaya Utara. *Jurnal Elemen*, 3(1), 35. <https://doi.org/10.29408/jel.v3i1.305>
- Masroza, F. (2013). Prevalensi Anak Berkesulitan Belajar Di Sekolah Dasar Se Kecamatan Pauh Padang. *Jurnal Ilmiah Pendidikan Khusus*, 1(1), 215–227.
- Nida, K., Buchori, A., & Murtianto, Y. H. (2017). Pengembangan Comic Math Dengan Pendekatan SMP Berdasarkan Keterangan Dari Guru Matematika SMP IT Assaidiyah Kirig Mejobo Kudus Pada Tanggal 12 November 2016 bahwa rata-rata ulangan harian pendidikan untuk memotivasi peserta didik dalam belajar dan untuk. *Aksioma*, 8(1), 31–40.
- Ntobuo, N. E., Arbie, A., & Amali, L. N. (2018). The Development of Gravity Comic Learning Media Based on Gorontalo Culture. *Jurnal Pendidikan IPA Indonesia*, 7(2), 246–251.
- Nugraheni, N. (2017). Penerapan Media Komik Pada Pembelajaran Matematika Di Sekolah Dasar. *Refleksi Edukatika : Jurnal Ilmiah Kependidikan*, 7(2), 111–117.

<https://doi.org/10.24176/re.v7i2.1587>

- Pakpahan, A. F., Ardiana, D. P. Y., Mawati, A. T., Wagi, E. B., Simarmata, J., Mansyur, M. Z., Ili, L., Purba, B., Chamidah, D., & Kaunang, F. J. (2020). *Pengembangan Media Pembelajaran*. Yayasan Kita Menulis.
- Panjaitan, R. G. P., & Marlina, R. (2016). Respon Siswa Terhadap Media E-Comic Bilingual Sub Materi Bagian-Bagian Darah. *Jurnal Pendidikan Dan Pembelajaran Khatulistiwa*, 5(3).
- Pritandhari, M. (2016). Penerapan Komik Strip Sebagai Media Pembelajaran Mata Kuliah Manajemen Keuangan Mahasiswa Universitas Muhammadiyah Metro. *PROMOSI: Jurnal Program Studi Pendidikan Ekonomi*, 4(2).
- Purba, R. A., Tamrin, A. F., Bachtar, E., Makbul, R., Rofiki, I., Metanfanuan, T., Masrul, M., Simarmata, J., Juliana, J., & Irawan, E. (2020). *Teknologi Pendidikan*. Yayasan Kita Menulis.
- Putri, E. L., Dwijanto, D., & Sugiman, S. (2017). Analysis of Mathematical Communication Skills and Confidence of 10th Grader of SMK in Geometry Material Viewed from Cognitive Style. *Unnes Journal of Mathematics Education*, 6(1), 97–107.
- Ramadhani, E. D. (2019). Pengembangan Komik Matematika Berbasis RME (Realistic Mathematics Education) Untuk Meningkatkan Kemampuan Pemecahan Masalah Keliling Dan Luas Segitiga Siswa SMP Kelas VII. *JPM: Jurnal Pendidikan Matematika*, 3(1), 22. <https://doi.org/10.33474/jpm.v3i1.2609>
- Riduwan, M. (2013). Belajar Mudah Penelitian Untuk Guru, Karyawan dan Peneliti Pemula. In *Bandung: Alfabeta*. <https://doi.org/10.22437/edufisika.v3i01.3867>
- Romberg, T. A. (1989). *Curriculum and Evaluation Standards For School Mathematics*. National Council of Teachers of.
- Sanjaya, W. (2012). *Media Komunikasi Pembelajaran*. Jakarta: Kencana Prenada Media Group.
- Sari, F. K., Farida, & M.Syazali. (2016). Pengembangan Media Pembelajaran (Modul) berbantuan Geogebra Pokok Bahasan Turunan Fiska. *Jurnal Pendidikan Matematika*, 7(2), 135–152.
- Thiagarajan, S. (1974). *Instructional Development for Teacher of Exceptional Children*. Bloomington: Indiana University.
- Vaughn, S., Bos, C. S., & Schumm, J. S. (2013). *Teaching Students Who Are Exceptional, Diverse, and at Risk In The General Education Classroom*. Allyn & Bacon.
- Wahyuningsih, N. A. (2012). Pengembangan Media Komik Bergambar Materi Sistem Saraf Untuk Pembelajaran Yang Menggunakan Strategi Pq4R. *Journal of Innovative Science Education*, 1(1).
- Widyasari, N., Dahlan, J. A., & Dewanto, S. (2016). Meningkatkan Kemampuan Disposisi Matematis Siswa SMP Melalui Pendekatan Metaphorical Thinking. *FIBONACCI: Jurnal Pendidikan Matematika Dan Matematika*, 2(2), 28–39.
- Wijayanti, R., Hasan, B., & Loganathan, R. K. (2018). Media Comic Math Berbasis Whiteboard Animation Dalam Pelajaran Matematika. *Jurnal Riset Pendidikan Matematika*, 5(1), 53. <https://doi.org/10.21831/jrpm.v5i1.19207>
- Winarto, A. C. W. E., & Yuniarta, T. N. H. (2018). Pengembangan Mobile Learning

Matematika Sebagai Suplemen Belajar SMA Kelas XI Pada Materi Irisan Kerucut. *Histogram*, 2(1), 32–44.

Yustiana, Y., Kusmayadi, T. A., & Fitriana, L. (2021). The Effect Mathematics Disposition of Vocational High School Students on Mathematical Problem-Solving Ability. *IOP Conference Series: Earth and Environmental Science*, 1808(1). <https://doi.org/10.1088/1742-6596/1808/1/012049>

Zayyadi, M., Supardi, L., & Misriyana, S. (2017). Pemanfaatan Teknologi Komputer Sebagai Media Pembelajaran Pada Guru Matematika. *Jurnal Pengabdian Masyarakat Borneo*, 1(2), 25. <https://doi.org/10.35334/jpmb.v1i2.298>