**International Journal of Social Learning**
August 2025, Vol. 5 (3), 522-540
e-ISSN 2774-4426 and p-ISSN 2774-8359
DOI: https://doi.org/10.47134/ijsl.v5i3.418

# Development of E-Comic Mathematics with Nuance of Religious Values and Critical Thinking of Geometry Material in Junior High School

Budi Cahyono[1*], Rina Dwi Setyawati[2], Muhammad Aunur Rohman[3]

[1,3]*Universitas Islam Negeri Walisongo Semarang, Indonesia*
[2]*Universitas PGRI Semarang, Indonesia*

*e-mail: budi.cahyono@walisongo.ac.id

## ABSTRACT

*The low interest of Junior High School (SMP/MTs) students in reading textbooks results in many students having difficulty learning geometry material, and impacts students' low critical thinking skills. This study attempts to develop interactive learning media as e-comic media based on religious values, critical thinking, and contextual problems that are valid, practical, and effective. The development method uses the stages of defining, designing, developing, and disseminating (4D Method). The study subjects were material experts, media experts, teachers, and students at MTs Askhabul-Kahfi Semarang. The instruments in this study used expert validation questionnaires, practicality questionnaires, and critical thinking ability test questions. Data processing used the Independent Samples t-test statistical test with SPSS. The study results stated that e-comics are suitable for use because they are stated to be very valid, practical, and effective in increasing the average value of critical thinking skills.*

***Keywords*:**

Critical Thinking; E-comic; Religious Values; Contextual Problems.

## ABSTRAK

*Rendahnya minat siswa MTs/SMP dalam membaca buku teks mengakibatkan banyak siswa yang kesulitan dalam mempelajari materi geometri, dan berdampak pada rendahnya kemampuan berpikir kritis siswa. Penelitian ini berupaya mengembangkan media pembelajaran interaktif berupa media e-komik berbasis nilai-nilai agama, berpikir kritis, dan masalah kontekstual yang valid, praktis, dan efektif. Metode pengembangan menggunakan tahapan pendefinisian, perancangan, pengembangan, dan penyebaran*



**Submitted: 2025-02-02; Accepted: 2025-07-20; Published: 2025-08-30**
***Corresponding author:** budi.cahyono@walisongo.ac.id

*(Metode 4D). Subjek penelitian adalah ahli materi, ahli media, guru, dan siswa di MTs Askhabul-Kahfi Semarang. Instrumen dalam penelitian ini menggunakan angket validasi ahli, angket praktikalitas, dan soal tes kemampuan berpikir kritis. Pengolahan data menggunakan uji statistik Independent Samples t-test dengan SPSS. Hasil penelitian menyatakan bahwa e-komik layak digunakan karena dinyatakan sangat valid, sangat praktis, dan efektif dalam meningkatkan nilai rata-rata kemampuan berpikir kritis.*

***Kata kunci*:**

Berpikir Kritis; E-komik; Nilai Religius; Masalah Kontekstual.

## 1. Introduction

Learning tools must be created by a teacher/lecturer so that learning can run according to structured planning, maximize the active role of students in learning, and be fun, inspiring, and challenging in achieving learning goals. According to Kunandar (Kunandar, 2014) learning that takes place in a fun, inspiring, interactive, and challenging way, and can motivate students to participate actively, must begin with the preparation of systematic and complete learning tools by each educator/teacher/lecturer to achieve learning objectives.

Critical thinking is one of the important skills students must have and pay attention to to achieve optimal learning goals. According to Johnson and Toheri (Johnson & Johnson, 2009; Toheri et al., 2022) According to Johnson and Toheri, critical thinking skills are essential for students to solve problems at school and in their future lives. Zainudin and Istiyono (Zainudin & Istiyono, 2019) stated that critical thinking skills are one of the skills that students must have, in addition to creativity and innovation, communication skills, and problem-solving. Critical thinking skills consistently top the list of things that are important in college and career readiness (Costa & Kallick, 2014; Kraisuth & Panjakajornsak, 2018; Zainudin & Istiyono, 2019). Murtianto (Murtianto & Harun, 2014) stated that mathematics learning must accommodate increasing student potential in high-order thinking processes.

The critical thinking skills of students in Indonesia are still relatively low. This follows the results of several studies, which reveal that the critical thinking skills of students in Indonesia are still relatively low (Hidayati & Sinaga, 2019; Syahrial, Asrial, Kurniawan, & Pratama, 2019; Tanudjaya & Doorman, 2020). The results of the PISA and TIMSS test reports state that the average value of non-routine mathematical problem-solving ability is below average. This shows that students' literacy and non-routine problem-solving abilities are still relatively low, which results in the relatively low high-level thinking abilities (critical and creative) of Indonesian students (Aprilia et al., 2023; Cahyono, Rohman, Setyawati, & Mustaghfiroh, 2022).

Students at Junior High School/MTs/SMP Askhabul-Kahfi Semarang also experience students' low critical thinking skills. This information is based on the results of interviews with mathematics

subject teachers who stated that students' interest in reading textbooks is quite low, especially in mathematics; Students give up easily if they find difficult questions; Students find it difficult to identify important elements in the information provided (story questions) which results in students being unable to develop correct and appropriate problem-solving strategies; Students find it difficult or even unable to solve problems in non-routine forms (different from example questions); Students tend to want to read books if they are stories that contain colors and pictures; Students are busy playing if they are related to Android/HP. Based on this information, an innovation is needed to improve students' low critical thinking skills. One alternative that can be applied is using appropriate, interesting, high-tech learning media innovations.

Interesting learning media that adapts to technological developments can be an alternative solution to improve critical thinking skills to achieve learning goals. According to several experts, the development of learning media that takes into account technological developments provides more appeal to students to learn (Cahyono, Romadiastri, & Maslikhah, 2016; Hidayat & Aripin, 2023; Hidayat, Rohaeti, Hamidah, & Putri, 2023; Motta, Stecula, & Farhart, 2020). The development of interactive electronic modules based on the local wisdom of Padeglang for MTs on number patterns, opportunities, flat-sided spatial structures, and algebra can increase students' interest and mathematical literacy skills (Isnaintri et al., 2023). Several researchers have revealed that the use of GeoGebra, Matrix Laboratory (MATLAB), and Kvisoft Flipbook Maker applications is effective in improving student learning achievement (Cahyono, 2016; Cahyono, Tsani, & Rahma, 2020; Sofyan, Sugandi, Linda, Sari, & Bernard, 2022; Wibowo & Pratiwi, 2018; Zetriuslita, Nofriyandi, & Istikomah, 2020).

Several media development studies have adjusted the developmental stages of students and the tendency for people to be more interested in reading books if there are lots of pictures and colors, like in comics. According to several researchers, comics have several advantages, such as stimulating reading interest and learning motivation, especially for elementary school students, because they contain many images that are appropriate to their level of development (Daulay, 2017; Ntobuo, Arbie, & Amali, 2018). Comics with simple illustrations may be better than other learning media in achieving learning objectives (Kim, Chung, Jang, & Chung, 2016). Many people from various backgrounds and ages love comics (Aprilia et al., 2023; Özdemir, 2017). It is suitable to be applied as teaching material to support learning activities. Students are more challenged/enthusiastic about completing assignments to analyze stories and art using their critical thinking skills if the learning media is in the form of comics (Nida, Buchori, & Murtianto, 2017; Reilly, 2015).

Several studies have revealed that the development of electronic comics, often referred to as e-comics, has been carried out by several researchers to improve student learning outcomes and reduce the weaknesses of traditional comics, which are easily torn, lost, less compatible, and less adaptable to technological developments. According to Cahyono (Cahyono et al., 2016) electronic comics (e-comics) or digital comics are learning durable medium (not easily damaged), easy to carry anywhere, and can arouse students' interest in learning. Students can use mathematics e-comics as a learning resource independently or in class, as they contain educational elements that are adapted to the

material, environment, and needs of students (Bernika & Cahyono, 2021). Nida developed an electronic mathematical comic on cube and block material for junior high school level using an ethnomathematics approach that is suitable for use and can improve student learning outcomes (Nida et al., 2017).

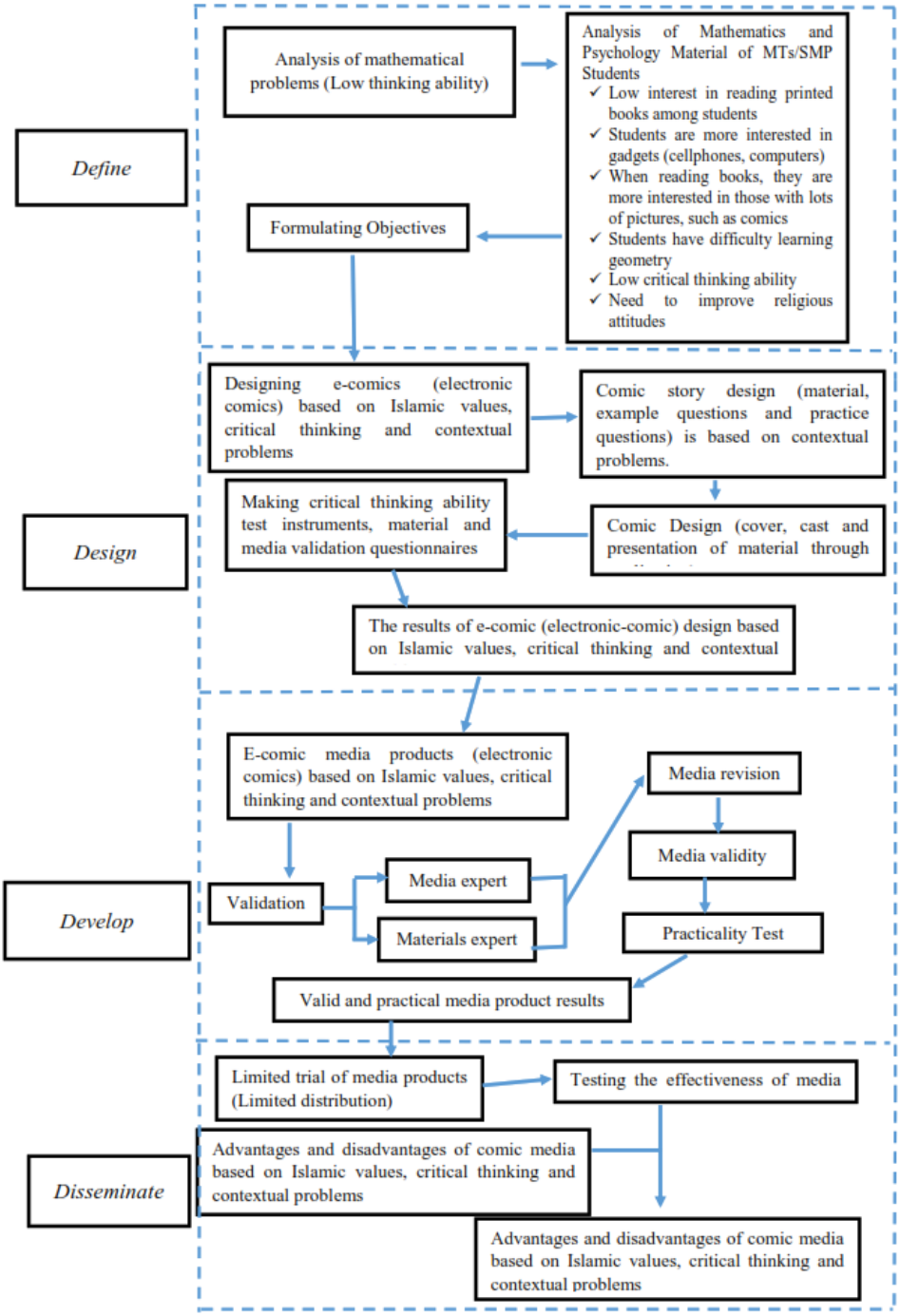
E-comics is very effective as a learning medium when viewed from the psychomotor, cognitive, and affective aspects (Hermawan, Hobri, Murtikusuma, Setiawani, & Yudianto, 2018; Kartika, Azhar, & Nasir, 2023). The development of learning media using comics as a learning medium can increase character values, self-confidence, and student motivation. (Hosler & Boomer, 2011; Norton, 2003). Using e-comics media effectively improves students' scientific literacy skills through scientific-based learning (Aulia, Permana P, Zarkasih, & Nova, 2020; Fitria, Malik, Mutiaramses, Halili, & Amelia, 2023).

The development of problem-based comics in Senior High Schools/Madrassas is effective for students' creative thinking skills (Zarvianti & Sahida, 2020). In his research, Cahyono (Cahyono, Rohman, Setyawati, & Dzakiyyah, 2023a) Revealed that developing e-comics on geometry material based on ethnomathematics and creative thinking at the MTs/SMP level increased students' learning motivation. The use of e-comics as a learning medium can improve students' character values (Murti, Gunarhadi, & Winarno, 2020; Nida et al., 2017; Patria & Mutmainah, 2018). Based on the analysis of previous research, there has been no research on e-comics based on religious values, critical thinking, and contextual problems in the form of projects in mathematics subjects to improve critical thinking skills. So, the research differs from previous studies because mathematical e-comics on geometry material at the MTs/SMP level are developed based on religious values, critical thinking, and contextual or cultural problems (Ethnomathematics) in the form of projects through the Canva application. So, the purpose of this study is to develop e-comic learning media on geometry material at the MTs/SMP level based on religious values, critical thinking, and contextual problems that are valid, practical, and effective for critical thinking skills.

## 2. Methods

This research is categorized as Research and Development (R&D) research, because this research aims to produce a product and test the effectiveness of the product so that it can be useful in certain communities (Thiagarajan & Sivasailam, 1974). The learning media development method used in this study uses the definition, design, development, and dissemination stages known as 4D (Thiagarajan & Sivasailam, 1974). This research is expected to be able to produce a product in the form of an e-comic learning media for geometry material based on Islamic values, critical thinking, and contextual problems using the Canva application and test the limited effectiveness of the e-comic on critical thinking skills with limited time and place in class VIII at MTs Askhabul Kahfi Semarang. The population of this study was grade VIII students of MTs Askhabul Kahfi Semarang. The random sampling method was used to determine class VIII A as the experimental class (20 students) and class VIII B (19 students) as the control class. Data processing used the Independent Samples t-test statistical test with SPSS. All stages of developing e-comic media for geometry

material based on religious values, critical thinking, and contextual problems are presented in Figure 1 below;




**Picture 1.** E-comic Development Methods and Flow

Picture 1 explains the activities carried out in each stage of 4D, at the define stage it is used to analyze the problems faced and their causes in the mathematics learning process; At the design stage,

researchers design the right solution to overcome problems based on considerations of their causes through literature reviews; At the develop stage, researchers develop e-comic media based on religious values, critical thinking and contextual problems through the Canva application and continue with expert validity tests and practicality tests; at the disseminated stage, researchers test the effectiveness of the e-comic media that has been developed.

This study used an instrument consisting of a validation sheet of media experts and material experts in the form of a closed questionnaire, and a critical thinking ability test on geometry material (pre-test and post-test). Data analysis in this study used qualitative descriptive techniques. The validity criteria for the development of e-comic media range from invalid to very valid, based on the average score given by experts. The validity criteria in this study are presented in Table 1 below;

**Table 1.** Validity Interval Range

| **Average ( $\overline{x}$ )** | **Classification** |
|---|---|
| $3 \leq \overline{x} < 4$ | Very valid |
| $2 \leq \overline{x} < 3$ | Valid |
| $1,0 \leq \overline{x} < 2$ | Less Valid |
| $0,0 \leq \overline{x} < 1$ | Invalid |

(Sugiyono, 2017).

The critical thinking ability indicator in this study adapts Ennis' opinion through the term FRISCO (Focus, Reason, Inference, Saturation, Clarity, Overview) (Cahyono, 2017). The effectiveness test of e-comic learning media is based on data analysis assisted by the SPSS application through the Independent Samples t-test with a significance level of 5%.

## 3. Results and Discussion

### *3.1 Define*

At this stage, three main studies are important in developing e-comic media that will be analyzed: student characteristics, curriculum, and media. Junior high school/Islamic junior high school students aged 12-15 years will begin to be able to think abstractly and logically in their cognitive development because they are entering the concrete-formal stage (Aini & Hidayati, 2017; Leongson & Limjap, 2003). The decline in interest in reading and the low thinking skills of students are among the negative impacts of technological developments. As stated in several studies, students'

interest in reading textbooks and their thinking skills are still low. They are more interested in Android cellphones, and even if they read books, they prefer books with lots of pictures and colors, such as comics (Cahyono et al., 2016; Triatmojo, Fadillah, & Sandie, 2021; Widyasari & Nurcahyani, 2021).

So, to develop students' thinking skills, learning media is needed as a support. Curriculum analysis is carried out to ensure that learning outcomes and competencies that students must master have been described in the competency achievement indicators for the material that is used as a reference for developing e-comic media (Wakhid, Zaenuri, Sugiman, Isnarto, & Cahyono, 2023). Textbooks and learning media are supporting tools to achieve the established competencies (Cahyono & Adilah, 2016).


**Picture 2.** Contextual Problems of Geometric Form Analysis in Semarang Batik Motifs and Historical Buildings in Semarang

Picture 2 shows an example of Semarang culture in the form of historical buildings and various typical Semarang batik motifs planned to be used as contextual problems included in the e-comic storyline to support critical thinking skills. According to Sari et al (Sari, Wulandari, Umah, & Mustangin, 2021) Students' interest in learning can be increased through contextual problems and is positively correlated with critical thinking skills. Tari & Rosana (Tari & Rosana, 2019) Stated that learning based on contextual problems can encourage the development of students' critical thinking and practical skills.

Aspects that are considered in media development include; (1) visual aspects including the suitability of images to the storyline created, suitability of coloring and image layout; (2) typographic aspects including the selection of appropriate text types, text readability, and text size; (3) characterization aspects include the suitability of the comic actor's character; (4) material aspects include learning materials that are determined and based on contextual problems, clarity of religious messages, and ease of understanding; and linguistic aspects include aspects of language suitability that meet correct spelling, sentences that are easy to understand, effective and efficient. According to the opinions of several experts who state that the use of appropriate language in media in certain forms of learning can significantly improve learning achievement in the realm of mathematics learning media (Bermejo, Ester, & Morales, 2021; Espinas & Fuchs, 2022; Wahyuni, Pangestu, Mursyida, & Pangestu, 2020; Wilkerson et al., 2022).

*3.2 Design*

This stage begins with designing e-comic media based on religious values, critical thinking, and contextual problems by considering several important points: determining characters, the storyline used, creating conversation scripts, and character formation from the coloring process. The creation of this e-comic design was assisted using Canva software. One of the efforts to ensure that e-comics can improve critical thinking skills is that the storyline is arranged in the form of a project based on contextual problems and religious attitudes associated with Semarang's unique culture (ethnomathematics). In accordance with several studies that reveal that problems presented in the form of projects and solved as a team, effective learning improves critical thinking skills (Aristin & Purnomo, 2022; Issa & Khataibeh, 2021). The use of a problem-based ethnomathematics approach to multimodal material can support the improvement of critical thinking skills (Suryawan, Jana, Pujawan, Hartawan, & Putri, 2023).


**Picture 3.** E-comic Cover with Religious Characters

Picture 3 provides information that the e-comic characters in this study wear clothes that cover their genitals, are cheerful, and do not give up easily in learning as part of the religious character that appears because it is following the results of behavioral observations of the dominant number of MTs/SMP students where the experiment took place and is one of the supporters of critical thinking skills. In accordance with the research results of Khasanah (Khasanah, Sajidan, Sutarno, Prayitno, & Walid, 2019) and Rahman (Rahman, Walid, & Humaidi, 2022) which stated that religious attitudes have a positive effect on critical thinking skills.

*3.3 Develop*

At this stage, the e-comic development process is carried out so that a draft of a mathematical e-comic with nuances of religious values, critical thinking, and contextual problems (ethnomathematics) is obtained in the form of a project on geometry material at MTs/SMP level and is continued with validation and practicality tests by experts. The content, graphics, and language

aspects are important references that expert validators consider in assessing and providing input for revision so that the draft of the e-comic on geometry material can be declared valid. The results of the validity test are presented in Table 2.

**Table 2.** Validation Results of E-Comics on Mathematics Based on Religious Values, Critical Thinking, and Contextual Problems in Geometry Material

| Aspect | Average Validity | Criteria |
|---|---|---|
| Content/Material/Content | 3,88 | Very valid |
| Graphics/ Display | 3,89 | Very valid |
| Language | 3,81 | Very valid |
| Average | 3,86 | Very valid |

Based on Table 2, information was obtained that the average score of the validator of the e-comic mathematics material on geometry with nuances of religious values, critical thinking, and contextual problems was 90.3, with very valid criteria. After minor revisions to the draft or prototype according to the validator's suggestions, media development can proceed to the next stage, namely the practicality test. (Sugiyono, 2017; Thiagarajan & Sivasailam, 1974). The expert validator's notes used as a reference for revising the e-comic to become a better product are presented in Table 3.

**Table 3.** Suggestions and Revisions from Expert Validators

| Suggestion | Revision | |
|---|---|---|
| **Notes** | **Before** | **After** |
| Add a table of contents and pages, so it can help to read sequentially. | There is no table of contents or pages on the e-comic draft yet | Added table of contents and page numbers to e-comic |
| Add problems in the form of projects that can support critical thinking skills. | The number of problem scenarios in the form of projects that support critical thinking skills is still inadequate. | Adding project-based contextual problem scenarios that support critical thinking skills |
| There is a typo, please check the e-comic draft again. | Validator marks typos | Typos in the e-comic draft were all made |

Table 3 shows some notes from the validator for e-comic improvements that the researcher has followed up on as part of the revision. Furthermore, the e-comic media can be declared valid and used

in the next stage. Some improvements include adding a table of contents and contextual problems of geometry material in the form of projects to support critical thinking skills.


**Picture 4.** Use of Contextual Problems to Support Critical Thinking Skills

Picture 4 is an example of a comic section that involves contextual issues of Semarang's unique culture. In this context, batik motifs and historic buildings support students' critical thinking skills in geometry material. Based on the practicality test by two mathematics teachers and 15 students, it was stated that the e-comic learning media with religious nuances, critical thinking, and contextual problems of geometry material for MTS/SMP level students developed using the 4D model was stated to be practical, with an average score of 3,6. Based on the results of the validity and practicality tests, the draft of e-comic learning media with religious nuances, critical thinking, and contextual problems of geometry material for MTs/SMP level students can be used at the limited dissemination stage, namely the application of e-comic media in the learning process to test the effectiveness of the media on increasing learning motivation and critical thinking skills. In accordance with several studies on the development of e-comic media, which conducted validity and practicality tests as prerequisites for testing the effectiveness of e-comic media that was developed into the learning process (Cahyono et al., 2016; Indawati, Sulistyowati, Tri, Andariana, & Sari, 2024; Wakhid et al., 2023).

### *3.4 Disseminate*

The dissemination stage in this study was carried out on a limited population at MTs Askhabul Kahfi Semarang to test the effectiveness of learning media on critical thinking skills. Based on observations of the learning process using e-comics learning media for geometry material based on religious values, critical thinking, and contextual problems, there is an increase in good character/attitudes from students, including enthusiasm, passion, and not giving up easily if they

encounter problems with quite difficult questions. In accordance with research by Patria and Murti, which revealed that learning using e-comics can provide stimulus to increase motivation, character values, and students' self-confidence (Murti et al., 2020; Patria & Mutmainah, 2018). Improving students' character values can be supported through E-comics, which is a form of teaching material that can be used as online media on the internet, intranet, or other computer network media (Buchori & Setyawati, 2015). The development of e-comic media based on contextual problems and local culture can increase students' interest in learning (Cahyono, Rohman, Setyawati, & Dzakiyyah, 2023b; Fianto, Indriani, & L.Y. Aminas, 2023; Wewengkang & Ramadhan, 2024).

Students' critical thinking abilities in this study were measured using instruments in the form of pre-test and post-test questions. Pre-test questions are used to determine the initial abilities of MTs/SMP students before using e-comic learning media with religious nuances, critical thinking, and contextual problems of geometry material. Meanwhile, the post-test questions determine students' abilities after using religious-nuanced e-comic learning media and critical thinking on geometry material. Field trials were conducted in class VIIA as the experimental class and VIIB as the control class. Field trials were conducted in class VIIA as the experimental class and VIIB as the control class. The success rate was measured through a comparative test between the experimental and control classes, and the results of the field trials were processed using SPSS 16. In this study, the comparative test data analysis used the Independent Sample t-test, and the results obtained can be seen in Table 4.

**Table 4.** Independent Sample t-Test

| Independent Samples Test | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | |
| | | | | | | | | 95% Confidence Interval of the Difference | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Hasil belajar (Kemampuan Berpikir Kritis) | Equal variances assumed | 2.387 | .125 | 5.965 | 37 | .000 | 12.051 | 2.11323 | 8.41836 | 16.85665 |
| | Equal variances not assumed | | | 5.986 | 37 | .000 | 12.051 | 2.10580 | 8.44027 | 16.84573 |

By looking at the sig value in Table 4 about the Independent Samples t-test of 0.125. If the sig value is greater than 5%, then H0 is accepted, then there is no difference in variance between the experimental and control classes, or both classes are homogeneous. This information is used to conduct the next test, the t-comparative test. Because both classes are declared homogeneous, the row sequence is selected *Equal variances are assumed*. Furthermore, by looking at the value in the sig column (2-tailed) Independent sample t-test column of 0.000 <0.05 indicates that H0 is rejected, meaning that the learning outcomes in this case are the critical thinking skills of the experimental class and the control class are significantly different. Group Statistics analysis determines which class has a higher average value, as seen in Table 5.

**Table 5.** Table *Group Statistics*

| | **Class** | **N** | **Mean** | **Std. Deviation** | **Std. Error Mean** |
|---|---|---|---|---|---|
| Critical thinking | experiment | 20 | 82.051 | 7.95969 | 1.39213 |
| | control | 19 | 69.000 | 10.35784 | 1.76404 |

Table 5 provides information that the average critical thinking ability in the mean column is 82.051 for the experimental class and 69.00 for the control class, so it can be said that the learning outcomes (critical thinking ability) of the experimental class are better than the control class. In accordance with Rasiman's research (Rasiman. & Pramasdyahsari, 2014) which states that developing e-comic media based on flip book maker for junior high school mathematics material effectively increases discipline values and critical thinking skills. The development of electronic comic material for the MA/SMU level can improve critical thinking skills (Cahyono et al., 2016).

*3.5 Discussion*

Developing e-comic learning media with religious nuances, critical thinking, and contextual problems in geometry material for MTs/SMP level students can be considered suitable because it has undergone three stages of validity, practicality, and effectiveness testing. This is by previous development research, which stated that the resulting product can be declared feasible if it has passed validity, practicality, and effectiveness tests (Nur, Narulita, & Nuha, 2023; Octaria, Kesumawati, & Retta, 2022; Rahmawati, Zalisca, & Mahera, 2024; Risma, Rahmawati, & Dewi, 2022). The results of development research can be said to be suitable for use if they meet the assessment criteria for validity, practicality, and effectiveness (Elizabeth, 2019; Plomp & Nieveen, 2007; Thiagarajan, Sivasailam, 1974).

Contextual problems based on local Semarang culture (ethnomathematics) used as a reference in the process of developing e-comic media on geometry material for MTs/SMP students provide a significant contribution to the results of observations of the learning process, which reveal that student learning activity and interest have increased. In accordance with the results of several previous studies, using ethnomathematics with a specific cultural approach can provide optimal support to foster student learning activities and interests. (Lidinillah, Rahman, Wahyudin, & Aryanto, 2022;

Muliyati et al., 2021; Nurfauziah & Putra, 2022; Okti Yolanda & Putra, 2022; Riski, Jailani, & Fitriana, 2024; Suciati, Susilo, Lestari, & Gofur, 2022). The development of e-comics based on the ethnomathematics of the folk tale "Joko Kendil and Si Gundul" can improve students' critical thinking skills (Rahmasantika & Prahmana, 2022).

The success of developing e-comic media on geometry material for MTs/SMP students in increasing the average value of students' critical thinking skills cannot be separated from the form of an e-comic compilation approach based on problems in the form of projects that are effective for critical thinking skills. In accordance with the Aprilia (Aprilia et al., 2023) her research developed an e-comic based on STEM-PJBL probability material at junior high school level using the ADDIE method, which improved students' critical thinking skills and numeracy literacy. Jatiningsih (Jatiningsih & Dewi, 2022) stated that e-comics developed based on problem-based learning effectively improve critical thinking skills. E-comics used in learning can improve students' critical and creative thinking skills. (Yulaichah, Mariana, & Wiryanto, 2024; Zarvianti & Sahida, 2020).

## 4. Conclusion

The average validation of e-comic experts on content, appearance, and language obtained a score of 3.86 with a very valid qualification with minor revisions, and the average practicality score obtained a value of 3.6 with a very practical qualification. Data processing of critical thinking ability test results using SPSS 16 through the Independent Samples t-test formula of 0.125 means that there is a difference between the experimental class and the control class. The average value of the experimental class is 82.051, higher than the control class of 69.00, so it can be stated that using e-comics effectively improves critical thinking skills. So that the development of e-comic learning media based on religious values, critical thinking, and contextual problems (ethnomathematics) in the form of projects on geometry material for MTs/SMP levels is worthy of use because it meets the criteria of valid, practical, and effective. The trial of the e-comic development results in this study was limited to the implementation in one school, so further trials are needed in other junior high schools/Islamic junior high schools. The good results of this e-comic development are expected to inspire its development in other subjects.

## 5. References

Aini, I. N., & Hidayati, N. (2017). Tahap Perkembangan Kognitif Matematika Siswa Smp Kelas Vii Berdasarkan Teori Piaget Ditinjau Dari Perbedaan Jenis Kelamin. *Jurnal Penelitian Dan Pembelajaran Matematika*, *10*(2), 2–7. https://doi.org/10.30870/jppm.v10i2.2027.

Aprilia, G. M., Nabila, H., Karomah, R. M., Hs, E. I., Permadani, S. N., & Nursyahidah, F. (2023). Development of Probability Learning Media PjBL-STEM Based Using E-comic to Improve Students' Literacy Numeracy Skills. *Kreano:Jurnal Matematika Kreatif-Inovatif, 14*(1), 160–173. https://doi.org/https://doi.org/10.15294/kreano.v14i1.38840.

Aristin, N. F., & Purnomo, A. (2022). Improving Critical Thinking Skill Through Team-based Projects, is it Effective? *Journal of Education Research and Evaluation*, *6*(4), 586–594. https://doi.org/10.23887/jere.v6i4.48090.

Aulia, J., Permana P, N. D., Zarkasih, Z., & Nova, T. L. (2020). Meta-Analisis Pengaruh Penerapan

Pendekatan Saintifik Berbantuan Komik terhadap Hasil Belajar IPA Siswa SMP. *Journal of Natural Science and Integration*, *3*(1), 70. https://doi.org/10.24014/jnsi.v3i1.9617.

Bermejo, V., Ester, P., & Morales, I. (2021). How the Language of Instruction Influences Mathematical Thinking Development in the First Years of Bilingual Schoolers. *Frontiers in Psychology*, *12*(April), 1–11. https://doi.org/10.3389/fpsyg.2021.533141.

Bernika, R. N., & Cahyono, N. A. (2021). Problem Solving Skill Seen from Adversity Quotient through Problem Based Learning Assisted by E-Comic Math. *Unnes Journal of Mathematics Education Reseach*, *10*(2), 147–154. Retrieved from http://journal.unnes.ac.id/sju/index.php/ujmer.

Buchori, A., & Setyawati, R. D. (2015). Development learning model of charactereducation through e-comic in elementary school. *International Journal of Education and Research*, *3*(9), 369–386. Retrieved from https://www.ijern.com/journal/2015/September-2015/30.pdf.

Cahyono, B. (2016). Penggunaan Software Matrix Laboratory (Matlab) Dalam Pembelajaran Aljabar Linier. *Phenomenon : Jurnal Pendidikan MIPA*, *3*(1), 45–62. https://doi.org/10.21580/phen.2013.3.1.174.

Cahyono, B. (2017). Analisis Ketrampilan Berpikir Kritis Dalam Memecahkan Masalah Ditinjau Perbedaan Gender. *Aksioma*, *8*(1), 50. https://doi.org/10.26877/aks.v8i1.1510.

Cahyono, B., & Adilah, N. (2016). Analisis Soal dalam Buku Siswa Matematika Kurikulum 2013 Kelas VIII Semester I Berdasarkan Dimensi Kognitif dari TIMSS. *JRPM (Jurnal Review Pembelajaran Matematika)*, *1*(1), 86–98. https://doi.org/10.15642/jrpm.2016.1.1.86-98.

Cahyono, B., Rohman, ahmad A., Setyawati, R. D., & Dzakiyyah, R. 'Ilmi. (2023a). Pengembangan Media Pembelajaran E-komik Berbasis Etnomatematik dan Kemampuan Berpikir Kreatif pada Materi Geometri MTs. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *12*(2), 2283–2295. https://doi.org/10.24127/ajpm.v12i2.7398.

Cahyono, B., Rohman, A. A., Setyawati, R. D., & Dzakiyyah, R. 'Ilmi. (2023b). Pengembangan Media Pembelajaran E-komik Berbasis Etnomatematik dan Kemampuan Berpikir Kreatif pada Materi Geometri MTs. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *12*(2), 2283. https://doi.org/10.24127/ajpm.v12i2.7398.

Cahyono, B., Rohman, A. A., Setyawati, R. D., & Mustaghfiroh, U. (2022). Critical thinking of prospective teachers in solving math problems in terms of learning styles. *Phenomenon : Jurnal Pendidikan MIPA*, *12*(2), 226–241. https://doi.org/https://doi.org/10.21580/phen.2022.12.2.13349.

Cahyono, B., Romadiastri, Y., & Maslikhah, S. (2016). Pengembangan Perangkat Pembelajaran melalui E-Comic Berbasis Scientifik Approach pada Mata Pelajaran Matematika Materi Limit Fungsi. *Jurnal Pendidikan Matematika FKIP Unissula*, *4*(1), 71–83. Retrieved from https://www.e-jurnal.com/2017/04/pengembangan-perangkat-pembelajaran_51.html.

Cahyono, B., Tsani, D. F., & Rahma, A. (2020). Pengembangan Buku Saku Matematika Berbasis Karakter Pada Materi Trigonometri. *Phenomenon : Jurnal Pendidikan MIPA*, *10*(1), 25–35. https://doi.org/https://doi.org/10.21580/phen.2018.8.2.2929.

Costa, A. l, & Kallick, B. (2014). *Dispositions: Reframing teaching and learning*. Thousand Oaks: CA: Corwin.

Daulay, M. I. (2017). Developing Social Science Science-History ' s Comics- Based Learning Media

for the Fifth h Grade of Primary School in Pekanbaru City. *International Journal of Research in Counseling and Education*, *01*(01), 15–21. https://doi.org/10.24036/008za0002.

Elizabeth, A. (2019). *Design Research: Developing effective feedback interventions for school- based monitoring*. Africa: Wits University Press. https://doi.org/http://dx.doi.org/10.18772/22019032750.25.

Espinas, D. R., & Fuchs, L. S. (2022). The effects of language instruction on math development. *Child Development Perspectives*, *16*(2), 69–75. https://doi.org/10.1111/cdep.12444.

Fianto, Z. A., Indriani, F., & L.Y. Aminas. (2023). The Development of E-Comics in Integrated Science and Religious Values for 5th Grade Students. *International Journal of Learning Reformation in Elementary Education*, *2*(02), 68–76. https://doi.org/10.56741/ijlree.v2i02.75.

Fitria, Y., Malik, A., Mutiaramses, Halili, S. H., & Amelia, R. (2023). Digital comic teaching materials: It's role to enhance student's literacy on organism characteristic topic. *Eurasia Journal of Mathematics, Science and Technology Education*, *19*(10). https://doi.org/10.29333/ejmste/13573.

Hermawan, L. I., Hobri, H., Murtikusuma, R. P., Setiawani, S., & Yudianto. (2018). Pengembangan E-Comic Berbantuan Pixton Pada Materi Program Linear Dua Variabel. *Kadikma: Jurnal Matematika Dan Pendidikan Matematika*, *9*(2), 78–88. https://doi.org/https://doi.org/10.19184/kdma.v9i2.9748.

Hidayat, W., & Aripin, U. (2023). How To Develop an E-Lkpd With a Scientific Approach To Achieving Students' Mathematical Communication Abilities? *Infinity Journal*, *12*(1), 85–100. https://doi.org/10.22460/infinity.v12i1.p85-100.

Hidayat, W., Rohaeti, E. E., Hamidah, I., & Putri, R. I. I. (2023). How can android-based trigonometry learning improve the math learning process? *Frontiers in Education*, *7*(January), 1–13. https://doi.org/10.3389/feduc.2022.1101161.

Hidayati, Y., & Sinaga, P. (2019). The profile of critical thinking skills students on science learning. *Journal of Physics: Conference Series*, *1402*(4). https://doi.org/10.1088/1742-6596/1402/4/044075.

Hosler, J., & Boomer, K. B. (2011). Are Comic Books an Effective Way to Engage Nonmajors in Learning and Appreciating Science ? 1. *CBE—Life Sciences Education*, *10*(fall), 309–317. https://doi.org/10.1187/cbe.10-07-0090.

Indawati, N., Sulistyowati, P., Tri, F., Andariana, P., & Sari, Y. I. (2024). *Development of Interactive Comic Media with a Contextual Approach to Social Science Learning for Primary School*. *5*(December), 43–58. https://doi.org/https://doi.org/10.47134/ijsl.v5i1.296.

Isnaintri, E.-, Nindiasari, H.-, & -, S.-. (2023). Development of Numeracy Literacy Instrument in the Context of Local Wisdom in Pandeglang at the Madrasah Tsanawiyah. *Phenomenon : Jurnal Pendidikan MIPA*, *13*(1), 111–131. https://doi.org/10.21580/phen.2023.13.1.16783.

Issa, H. B., & Khataibeh, A. (2021). The Effect of Using Project Based Learning on Improving the Critical Thinking among Upper Basic Students from Teachers' Perspectives. *Pegem Egitim ve Ogretim Dergisi*, *11*(2), 52–57. https://doi.org/10.14527/pegegog.2021.00.

Jatiningsih, N. A. L. B., & Dewi, N. R. (2022). Development of e-Comic Science Interactive Learning with Scratch (eCILS) Based on Problem Based Learning to Train Critical Thinking Skills for

Junior High School Students. *Unnes Science Education Journal*, *11*(2), 90–99. https://doi.org/10.15294/usej.v11i2.56448.

Johnson, D. W., & Johnson, R. T. (2009). An Educational Psychology Success Story: Social Interdependence Theory and Cooperative Learning. *Educational Researcher*, *38*(5), pp.365–379. https://doi.org/10.3102/0013189X09339057.

Kartika, G., Azhar, A., & Nasir, M. (2023). Development of E-Comic as a Physics Learning Media for Class X Students on Momentum and Impulse Materials. *Jurnal Penelitian Pendidikan IPA*, *9*(1), 332–336. https://doi.org/10.29303/jppipa.v9i1.2391.

Khasanah, N., Sajidan, S., Sutarno, S., Prayitno, B. A., & Walid, A. (2019). Critical Thinking Ability and Student's Personal Religious Beliefs: An Analysis of DBUS Model Implementation. *Tadris: Jurnal Keguruan Dan Ilmu Tarbiyah*, *4*(1), 41–49. https://doi.org/10.24042/tadris.v4i1.4101.

Kim, J., Chung, M. S., Jang, H. G., & Chung, B. S. (2016). The Use of Educational Comics in Learning Anatomy Among Multiple Student Groups. *Anatomical Sciences Education*, *10*(1), 79–86. https://doi.org/10.1002/ase.1619.

Kraisuth, D., & Panjakajornsak, V. (2018). Thai AEC Engineer Readiness: A Confirmatory Factor Analysis. *SAGE Open*, *8*(1). https://doi.org/10.1177/2158244017745346.

Kunandar, K. (2014). *Penilaian Autentik (Penilaian Hasil Belajar Peserta Didik Berdasarkan Berdasarkan Kurikulum 2013)*. Jakarta: Raja Grafindo Persada.

Leongson, J. A., & Limjap, A. (2003). Assessing the Mathematics Achievementof College Freshmen Using Piaget' S Logical Operations. *Hawaii International Conference on Education in Waikiki*, 1–25. Retrieved from https://www.cimt.org.uk/journal/limjap.pdf.

Lidinillah, D. A. M., Rahman, Wahyudin, & Aryanto, S. (2022). Integrating Sundanese Ethnomathematics Into Mathematics Curriculum and Teaching: a Systematic Review From 2013 To 2020. *Infinity Journal*, *11*(1), 33–54. https://doi.org/10.22460/infinity.v11i1.p33-54.

Motta, M., Stecula, D., & Farhart, C. (2020). How right-leaning media coverage of Covid-19 facilitated the spread of misinformation in the early stages of the pandemic in the U.S. *Canadian Journal of Political Science*, *53*(2), 335–342. https://doi.org/10.1017/S0008423920000396.

Muliyati, D., Permana, H., Fauzi, M. R., Pratiwi, Y., Purwahida, R., Utami, I. S., & Siswoyo, S. (2021). The development of online comics to explain the "nuclear reaction" topic. *AIP Conference Proceedings*, *2331*(April). https://doi.org/10.1063/5.0041763.

Murti, D. K., Gunarhadi, & Winarno. (2020). *Development of Educational Comic with Local Wisdom to Foster Morality of Elementary School Students: A Need Analysis Desy*. *6*(2), 337–343. https://doi.org/10.12973/ijem.6.2.337.

Murtianto, Y. H., & Harun, L. (2014). Pengembangan Strategi Pembelajaran Matematika Smp Berbasis Pendekatan Metakognitif Ditinjau Dari Regulasi Diri Siswa. *AKSIOMA: Jurnal Matematika Dan Pendidikan Matematika*, *5*(2), 76–92. https://doi.org/https://doi.org/10.26877/aks.v5i2/septembe.762.

Nida, K., Buchori, A., & Murtianto, Y. H. (2017). Pengembangan Comic Math Dengan Pendekatan Etnomatematika Pada Meteri Kubus dan Balok di SMP. *Aksioma*, *8*(1), 31–40. https://doi.org/https://doi.org/10.26877/aks.v8i1.1531.

Norton, B. (2003). The Motivating Power of Comic book: Insigrchie Comic Readers. *International*

*Reading Association*, *57*(2), 140–147. Retrieved from https://www.jstor.org/stable/20205333.

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. https://doi.org/10.15294/jpii.v7i2.14344.

Nur, M. R., Narulita, E., & Nuha, U. (2023). Development Of Webtoon-Based Comic Learning Media On Human Respiratory System Topic For Class VIII Middle School. *Phenomenon : Jurnal Pendidikan MIPA*, *13*(1), 17–30. https://doi.org/10.21580/phen.2023.13.1.13865.

Nurfauziah, N., & Putra, A. (2022). Systematic Literature Review: Etnomatematika pada Rumah Adat. *Jurnal Riset Pembelajaran Matematika*, *4*(1), 5–12. https://doi.org/10.55719/jrpm.v4i1.351.

Octaria, D., Kesumawati, N., & Retta, A. M. (2022). Selecta Capita of Mathematics E-Book for SHS on Contextual Teaching and Learning (CTL) Approach. *Kreano:Jurnal Matematika Kreatif-Inovatif*, *13*(1), 136–150. https://doi.org/https://https://doi.org/10.15294/kreano.v13i1.31654.

Okti Yolanda, F., & Putra, A. (2022). Systematic Literature Review: Eksplorasi Etnomatematika Pada Motif Batik. *Prima Magistra: Jurnal Ilmiah Kependidikan*, *3*(2), 188–195. https://doi.org/10.37478/jpm.v3i2.1533.

Özdemir, E. (2017). Humor in Elementary Science : Development and Evaluation of Comic Strips about Sound. *International Electronic Journal of Elementary Education*, *9*(June), 837–850.

Patria, A. S., & Mutmainah, S. (2018). Using Textbook Illustration as Media for Developing Character among Primary Students : Some Research-based Suggestion. *Journal of Education and Learning (EduLearn)*, *12*(1), 52–56. https://doi.org/10.11591/edulearn.v12i1.6509.

Plomp, T., & Nieveen, N. M. (2007). An introduction to educational design research. *Proceedings of the Seminar Conducted*. Shanghai: the East China Normal University.

Rahman, Y., Walid, K. Al, & Humaidi. (2022). Critical Thinking and Religious Moderation Instilling Religiously Moderate Values through the Teaching of Islamic Philosophy in Indonesia. *Journal of Indonesian Islam*, *16*(1), 49–74. https://doi.org/10.15642/JIIS.2022.16.1.49-74.

Rahmasantika, D., & Prahmana, R. C. I. (2022). Math E-Comic Cerita Rakyat Joko Kendil Dan Si Gundul Untuk Menumbuhkan Kemampuan Berpikir Kritis Siswa Tunarungu. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *11*(2), 787–805. https://doi.org/https://doi.org/10.24127/ajpm.v11i2.4971.

Rahmawati, T., Zalisca, Z. S., & Mahera, P. (2024). Development Of Ludo Math Props To Improve Student Learning Interest In Logarithm Material Pengembangan Alat Peraga Ludo Matematika Untuk Meningkatkan Minat Belajar Siswa Pada Materi Logaritma. *Phenomenon : Jurnal Pendidikan MIPA*, *14*(1), 103–122. https://doi.org/https://doi.org/10.21580/phen.2024.14.1.22486.

Rasiman., & Pramasdyahsari, A. S. (2014). Development of Mathematics Learning Media E- Comic Based on Flip Book Maker to Increase the Critical Thinking Skill and Character of Junior High School Students. *International Journal of Education and Research*, *2*(11), 535–544. Retrieved from https://www.ijern.com/journal/2014/November-2014/44.pdf.

Reilly, E. M. (2015). Superheroes in math class: Using comics to teach diversity awareness. *Works and Days*, *32*(1), 61–74. Retrieved from https://worksanddays2.net/2014/File05.Reilly E.pdf.

Riski, M., Jailani, J., & Fitriana, S. N. (2024). Ethnomathematics-Inspired Mathematics Learning in Indonesia: A Systematic Literature Review. *International Journal of Multicultural and Multireligious Understanding*, *11*(9), 422–431. https://doi.org/http://dx.doi.org/10.18415/ijmmu.v11i9.6169.

Risma, F. A., Rahmawati, E., & Dewi, G. K. (2022). Pengembangan Buku Cergamatik Untuk Meningkatkan Keterampilan Berpikir Kreatif Siswa Kelas IV Sekolah Dasar. *Jurnal Ilmiah Mandala Education*, *8*(1), 596–603. https://doi.org/10.36312/jime.v8i1.2753.

Sari, O. P. D., Wulandari, N. A., Umah, W. K., & Mustangin. (2021). Analisis Kemampuan Berfikir Kritis Dalam Menyelesaikan Masalah Berdasarkan Minat Belajar Matematik. *AKSIOMA: Jurnal Matematika Dan Pendidikan Matematika*, *12*(3), 411. https://doi.org/https://doi.org/10.26877/aks.v12i3.7914.

Sofyan, D., Sugandi, A. I., Linda, L., Sari, D. R., & Bernard, M. (2022). Penerapan Strategi React Berbantuan Geogebra Dalam Meningkatkan Kemampuan Berpikir Kritis Matematis. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *11*(3), 1668. https://doi.org/10.24127/ajpm.v11i3.4995.

Suciati, R., Susilo, H., Lestari, U., & Gofur, A. (2022). Critical thinking skills: Profile and mastering concepts of undergraduate students. *International Journal of Evaluation and Research in Education*, *11*(3), 1250–1257. https://doi.org/10.11591/ijere.v11i3.22409.

Sugiyono, S. (2017). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta, CV.

Suryawan, I. P. P., Jana, P., Pujawan, I. G. N., Hartawan, I. G. N. Y., & Putri, P. E. W. (2023). Ethnomathematically Controversial Problem-Based Multimodal Approach in Terms of Students' Critical Thinking Ability. *Pegem Journal of Education and Instruction*, *13*(3), 323–336. https://doi.org/10.47750/pegegog.1.

Syahrial, S., Asrial, A., Kurniawan, D. A., & Pratama, R. A. (2019). Towards improving the critical thinking skills of pre-service teachers in Indonesia. *Journal of Education and Learning (EduLearn)*, *13*(4), 575–582. https://doi.org/10.11591/edulearn.v13i4.13613.

Tanudjaya, C. P., & Doorman, M. (2020). Examining higher order thinking in Indonesian lower secondary mathematics classrooms. *Journal on Mathematics Education*, *11*(2), 277–300. https://doi.org/10.22342/jme.11.2.11000.277-300.

Tari, D. K., & Rosana, D. (2019). Contextual Teaching and Learning to Develop Critical Thinking and Practical Skills. *Journal of Physics: Conference Series*, *1233*(1). https://doi.org/10.1088/1742-6596/1233/1/012102.

Thiagarajan, Sivasailam, and other. (1974). Instructional Development for Training Teachers of Exceptional Children. In *Journal of School Psychology* (Vol. 14). Washington, D. C.: National Center for Improvement of Educational Systems (DHEW/OE). https://doi.org/10.1016/0022-4405(76)90066-2.

Thiagarajan, & Sivasailam. (1974). *Instructional Development for Training Teachers of Exceptional Children*. Washinton DC: National Center for Improvement Educational System.

Toheri, Winarso, W., & Haqq, A. A. (2020). Where exactly for enhance critical and creative thinking: The use of problem posing or contextual learning. *European Journal of Educational Research*, *9*(2), 877–887. https://doi.org/10.12973/eu-jer.9.2.877.

Triatmojo, J., Fadillah, S., & Sandie, S. (2021). Pengembangan E-Comic sebagai Media Pembelajaran

Materi Bangun Ruang Sisi Datar Kelas VIII. *JURING (Journal for Research in Mathematics Learning)*, *4*(4), 331. https://doi.org/10.24014/juring.v4i4.14169.

Wahyuni, P., Pangestu, S. A., Mursyida, I. S. S., & Pangestu, A. (2020). The Effect of Mathematical Language On Learning Mathematics. *Proceeding International Conference on Science and Engineering*, *3*(April), 617–621. https://doi.org/10.14421/icse.v3.575.

Wakhid, A., Zaenuri, Z., Sugiman, S., Isnarto, I., & Cahyono, A. N. (2023). Kemampuan Berpikir Kreatif Matematis pada Pembelajaran Berpendekatan STEM. *JIIP - Jurnal Ilmiah Ilmu Pendidikan*, *6*(5), 3545–3551. https://doi.org/10.54371/jiip.v6i5.1675.

Wewengkang, N. D., & Ramadhan, I. (2024). *Development of E-Comic Teaching Materials with a Local Wisdom Theme to Enhance High School Student ' s Historical Awareness*. *16*, 4323–4335. https://doi.org/10.35445/alishlah.v16i4.5974.

Wibowo, E., & Pratiwi, D. D. (2018). Pengembangan Bahan Ajar Menggunakan Aplikasi Kvisoft Flipbook Maker Materi Himpunan. *Desimal: Jurnal Matematika*, *1*(2), 147. https://doi.org/10.24042/djm.v1i2.2279.

Widyasari, N., & Nurcahyani, A. (2021). Development of E-Comic-Based Mathematics Teaching Materials on the Topic of Multiplication and Division with Realistic Mathematics Education (RME) Approach. *Kreano, Jurnal Matematika Kreatif-Inovatif*, *12*(2), 365–375. https://doi.org/10.15294/kreano.v12i2.32482.

Wilkerson, T. L., Mistretta, R. M., Adcock, J., Yoder, G. B., Johnston, E., Bu, L., … Booher, L. (2022). Effects of Language on Children's Understanding of Mathematics: Implications for Teacher Education. *Electronic Journal for Research in Science & Mathematics Education*, *26*(2), 7–31. Retrieved from https://ejrsme.icrsme.com/article/view/21262.

Yulaichah, S., Mariana, N., & Wiryanto, W. (2024). The Use of E-Comics Based on A Realistic Mathematical Approach to Improve Critical and Creative Thinking Skills of Elementary School Students. *IJORER : International Journal of Recent Educational Research*, *5*(1), 90–105. https://doi.org/10.46245/ijorer.v5i1.497.

Zainudin, M., & Istiyono, E. (2019). Scientific approach to promote response fluency viewed from social intelligence: Is it effective? *European Journal of Educational Research*, *8*(3), 801–808. https://doi.org/10.12973/eu-jer.8.3.801.

Zarvianti, E., & Sahida, D. (2020). Designing Comics By Using Problem Based Learning (PBL) to Improve Student's Creative Thinking Skills. *International Journal of Social Learning (IJSL)*, *1*(1), 75–88. https://doi.org/DOI: https://doi.org/10.47134/ijsl.v1i1.8.

Zetriuslita, Nofriyandi, & Istikomah, E. (2020). the Effect of Geogebra-Assisted Direct Instruction on Students' Self-Efficacy and Self-Regulation. *Infinity Journal*, *9*(1), 41–48. https://doi.org/10.22460/infinity.v9i1.p41-48.