Improving the Ability of Understanding Mathematical Concepts through Digital-based Comics for Elementary School Students

by Rida Kusumadewi

Submission date: 22-Aug-2020 02:10AM (UTC+0800)
Submission ID: 1372339059
File name: jurnal_alibtida_rida_fironika.doc (126K)
Word count: 4995
Character count: 28844

AL IBTIDA: JURNAL PENDIDIKAN GURU MI (.....) VOL .... (....): .... - ....
DOI: http://dx.doi.org/ 10.24235 / al.ibtida.snj.

Al Ibtida: Jurnal Pendidikan Guru MI
ISSN: 2442-5133, e-ISSN: 2527-7227
Journal homepage: http://syekhnurjati.ac.id/jurnal/index.php/ibtida
Journal email: alibtida@syekhnurjati.ac.id

Improving the Ability of Understanding Mathematical Concepts through Digital-based Comics for Elementary School Students

Rida Fironika Kusumadewi *
* Department of Basic Education, Postgraduate Program, Universitas Negeri Jakarta, Indonesia.
*Primary Teacher Education Department, Faculty of Teacher Training and Education, Universitas Islam Sultan Agung, Semarang, Indonesia.
E-mail: ridafkd@unissula.ac.id

Amos Neolaka **
** Department of Basic Education, Postgraduate Program, Universitas Negeri Jakarta, Indonesia.
E-mail: amos_neolaka@yahoo.com

Mahmuddin Yasin ***
** Department of Human Resource Management, Postgraduate Program, Universitas Negeri Jakarta/ Universitas Krisnadwipaya, Indonesia.
E-mail: myasin.myconsulting01@gmail.com

Abstract

This study aims to improve the ability to understand mathematical concepts through digital-based comics. The subjects in this study were fifth- grade students who were in the genuksari area of Semarang. The data collection method is based on the test of the ability to understand mathematical concepts and uses quantitative data by looking at the normality test, homogeneity test, hypothesis testing, and difference test (t-test). The results showed that Lo count = 0.10 <Lo table = 0.89, which means that the data tested was normally distributed. Homogeneity test shows that Fount = 1.102 <Ftable = 1.6 at α = 0.05; Hypothesis test shows Fcount = 29.34> Ftable = 3.93. While the results of the t-test calculation show that count = 39.74> table = 1.98 at the significance level α = 0.05, meaning that users of digital-based comic teaching materials are better than conventional books in increasing students' ability to understand mathematical concepts. Therefore, the use of digital-based comic teaching materials can be an alternative to increasing the ability to understand mathematical concepts in elementary school students.

Keywords: Teaching Materials, Digital Comics, Ability to Understand Mathematical Concepts.

Abstrak

Penelitian ini bertujuan untuk meningkatkan kemampuan pemahaman konsep matematika melalui komik berbasis digital. Subjek dalam penelitian ini adalah siswa kelas lima yang berada di wilayah genuk sari semarang.

Metode pengumpulan data berdasarkan tes kemampuan pemahaman konsep matematika dan menggunakan data kuantitatif yaitu dengan melihat uji normalitas, uji homogenitas, uji hipotesis dan uji beda (t-tes). Hasil penelitian menunjukkan bahwa Lo hitung = 0,10 < Lo tabel = 0,89 yang berarti data yang diuji berdistribusi normal. Uji Homogenitas menunjukkan bahwa F_{hitung} = 1,102 < F_{tabel} = 1,6 pada α = 0,05; Uji hipotesis menunjukkan F_{hitung} =29,34 > F_{tabel} = 3,93. Sedangkan hasil perhitungan uji t menunjukkan T_{hitung} =39,74 > T_{tabel} = 1,98 pada taraf signifikansi α = 0,05 artinya pengguna bahan ajar komik berbasis digital lebih baik dari buku konvensional dalam meningkatkan kemampuan pemahaman konsep matematika siswa. Oleh karena itu penggunaan bahan ajar komik berbasis digital dapat menjadi alternatif dalam meningkatkan kemampuan pemahaman konsep matematika pada siswa sekolah dasar.

Kata kunci: Bahan Ajar, Komik Digital, Kemampuan Pemahaman Konsep Matematika.

INTRODUCTION

In learning many components are involved, one of which is teaching materials. Teaching materials are used to assist lecturers/ instructors in carrying out teaching and learning activities in class. Teaching materials are information, tools, and texts needed by teachers or instructors to plan and review the implementation of learning (Muchyidin, 2017). In line with technological advances, teaching materials can be printed and non-printed, meaning that the potential of the technology can be a powerful tool for transforming learning. Therefore, educators have the responsibility to prepare for the use of technology and assess the impact of using technology on children in the learning process. The learning process occurs in the delivery of information, which in its delivery can use tools to convey information or material that is the purpose of learning. This information delivery tool is called learning media. Digital and media literacy includes the ability to access, analyze, write, reflect on, and take action in the world. It is a broad and broad life skill. We think it is very important for basic educators to help strengthen children's self-expression and advocacy, reasoning, critical thinking, and communication skills. Today's education must have thought about digital literacy. Today's media is indispensable and very effective in increasing several capabilities. The use of technology in the 21st century is a habit that allows children to develop and be able to improve student competence (Hoobs & More, 2013).

Technological developments can be combined with the advantages of comics to produce learning media that is useful for students. One of them is digital comics. Although media innovations continue to emerge, reading comics remains a popular activity for children and adults (Jee & Anggoro: 2012). The messages conveyed by comics are in the form of still images and writing that form a series of stories and are able to provide a more concrete and real picture so that they can attract students' attention and interest in learning. Comics as a teaching material certainly has its own advantages for its users, in this case, namely students. Analysis conducted by Thorndike (Sudjana & Rivai, 2005) concluded that every month children almost read comic books twice. As has been done by research (Manalu, M. A., Hartono & Aisyah, 2017) through the arrangement of mathematics comic dialogues helping students understand the material while getting value planting. This is because comics have a coherent and orderly storyline that makes it easy to remember. Along with the development of technology, comics are not only in print but can also be in digital form. Recently, the

development of comic teaching materials has begun to be developed, however, teaching materials in the form of digital comics are still limited. According to (Heru Dwi Waluyanto, 2006) in terms of function, he explained that the engineering of learning comics would appear that something serious and complicated could be made in a clear and fun.

Digital comic teaching materials can improve several aspects of learning, one of which is the cognitive aspect. Mathematics is a subject that is difficult for students to be interested in because there are many factors that affect students in learning mathematics. these factors can be factors of negative influence, they can also be factors of positive influence. The ability of students in elementary schools at this time cannot be said to be maximal or high. This is evident from the value of student learning outcomes is still very low, especially mathematics subjects related to understanding concepts in flat shape material.

In accordance with the results of research (Triono, 2014) digital comic teaching materials have several advantages including (1) digital comic teaching materials are more durable than printed comic teaching materials; (2) making digital comic teaching materials cheaper and more efficient because printing does not need to be done. However, it does not rule out that users of digital comic teaching materials can also print comic teaching materials; (3) for teachers, digital comic teaching materials will be easier to distribute to students, namely through laptops or computers.

From several existing studies, the novelty in this research is that the development of digital-based comic teaching materials is very effective in the learning process. Referring to the research of Sagri et al, there is still a lack of learning using digital, on the other hand, that digital learning makes students interested in the learning to be delivered. In addition, based on the results of research by Kurniawati et al, that in the cognitive aspects the average learning rate is the lowest compared to other aspects, the digital comic teaching materials in this study are used to improve cognitive aspects, namely the ability to understand students' mathematical concepts.

Mathematics is one of the subjects that has a frightening predicate for students. In accordance with the times, it is time for educators to break the stigma that has been attached to the minds of students. According to (Anderson, Krathwohl, 2001) the teacher prioritizes the transfer of knowledge, the teacher must consider various categories of cognitive processes, namely the purpose of interpreting factual knowledge, the goal of explaining conceptual, the goal of executing procedural knowledge, the goal of differentiating conceptual knowledge, the goal of procedural knowledge, the goal of to criticize metacognitive knowledge and the goal of generating conceptual knowledge. Mathematics is an order of organized structure, mathematical concepts that are arranged hierarchically and systematically, starting from the simplest concepts to complex concepts.

Bruner said, learning mathematics is learning about the concepts and structures of mathematics contained in the material being studied and looking for relationships between mathematical concepts and structures. In geometric concepts, students are not only required to be able to distinguish these shapes but also knowing the relationship between geometric concepts through their understanding (Mawaddah & Mary, 2016). Understanding the concept leads students to learn mathematics actively and build on previous knowledge and experience. Indicators of the ability to understand concepts described in the study (Suraji, 2018), there are three indicators used, namely restating a concept and classifying objects according to the concept; presents concepts in various forms of mathematical representation; and using, utilizing, selecting specific procedures or operations and applying concepts. NCTM (2000) classifies indicators of mathematical understanding, namely 1) defining concepts verbally and in writing; 2)

identifying and producing examples and not examples; 3) using models, diagrams and symbols to present a concept; 4) changing one form of representation to another form of representation; 5) recognize the various meanings and interpretations of concepts; 6) identify the properties of a concept and recognize the conditions that define a concept; 7) comparing and contrasting concepts.

The novelty in this study the dependent variable taken is the ability to understand mathematical concepts on the indicator of students' ability to connect conceptual and procedural knowledge by defining concepts verbally and in writing; using a model, known facts to explain a thought. In making the problem of understanding mathematical concepts, the researcher uses operational verbs in Bloom's taxonomy where each thinking skill has different characteristics of the problem according to the indicator on the ability to understand mathematical concepts.

From the results of observations and interviews with the principal, that the low score of Mathematics on the results of mathematics exams was because students still could not observe the questions being tested. This is proven when students are given training before facing exams, students still feel confused in the process, besides that students still do not know the various meanings and relationships between different topics in mathematics, for example, students are often wrong when determining the formula between the volume of space with a broad approach, Another factor that appears is that the enthusiasm of students in doing the questions is still very low and students often do not take advantage of objects around them in working on these questions. In addition, running with the development of knowledge and technology in the era of globalization, teachers are strived to develop their potential through various pieces of training and seminars held by several institutions. It is also emphasized in research (Jannah, Prasojo & Jerusalem, 2020) that in line with the times and technology, digital literacy needs to get the special attention that must be developed by educators so that it can compensate for the tendencies of the characteristics possessed by students.

An anticipatory step that can be taken to improve the ability to understand mathematical concepts is to develop digital-based comic teaching materials for elementary school students. The development of digital-based comic teaching materials can also be seen as part of an effort to support the digital literacy movement. In addition, digital-based comic teaching materials are developed according to the needs and principles of learning design. based on the description of the results of the needs analysis above, it is necessary to carry out new research and innovations that will be developed, namely by developing digital-based comic teaching materials. The types of teaching materials developed are comic teaching materials that can be installed on Android phones and used offline.

Based on the existing background, the problem formulation in this study is whether digital-based comic teaching materials can improve the ability to understand mathematical concepts. Learning media have a positive contribution to learning, namely by delivering messages (Kemp, 2010). The selection of comic media is based on the characteristics of the comic itself, which packs a message into a story accompanied by interesting pictures and words (Rossana, 2019). This study has a mathematics learning objective, namely by training and cultivating systematic, logical, critical, creative, and consistent thinking and developing a persistent and confident attitude in solving problems (Prihandoko, 2006). In addition, it aims to understand mathematical concepts, explain the relationship between concepts and apply concepts or logarithms in a flexible, accurate, efficient, and precise way to solve problems (Hendriana & Soemarno, 2014).

METHODS

This study used a research development approach and method (Research and Development. This research was conducted in elementary schools in the Korsatpen Genuksari area of Semarang, which consisted of 3 schools with each school taken 1 class as the experimental class and the control class. 58 people from the experimental class and 54 from the control class.

The development stage of digital comic mathematics teaching materials was designed using research and development of the Brog and Gall and MPI models. The results of the adaptation of teaching materials development start from preliminary studies, development, validation, testing, and implementation of teaching materials. The teaching material design is developed into five steps. First, the preliminary study stage is to conduct literature studies and field studies. Second, the development of teaching materials is to compile digital mathematics-based comic instructional materials. Third, the validation of teaching materials by experts is to assess the feasibility of teaching materials by involving several experts according to their respective areas of expertise. Fourth, the trial of teaching materials is to assess the feasibility of digital comic teaching materials for users, namely students and teachers. The trial was carried out 3 times, namely one-on-one trials, small scale, and large scale. Fifth, the implementation of teaching materials is to use digital comic teaching materials in real learning. The implementation uses the experimental class design and the control class. The experimental and control class includes three schools located in the Genuksari area.

The research was conducted using research and development methods so that the subjects involved were adjusted according to the stages of teaching material design. Subjects during the preliminary study were 3 mathematics teachers and 3 grade V students. Subjects during the validation of teaching materials were 3 learning design experts, 3 mathematics material experts, and 3 language experts. The subjects during the trial of teaching materials were 10 students (one-on-one trial), 20 students (small-scale trial), 58 students (large-scale trial). Subjects when implementing the model were 58 students.

The research data consisted of preliminary study data, expert validation data, teaching material trial data, and teaching material implementation data. Data sources include teachers, students, image and graphic design experts, material experts, and language experts. Data were collected using interview guidelines, questionnaires, tests, and observation sheets. The research instrument used a questionnaire consisting of an instrument of product assessment of teaching materials by experts and an instrument of product assessment by teachers and students as users. In addition, there is a test instrument to measure students' understanding of mathematical concepts in the form of multiple-choice as many as 25 items.

The data analysis technique of the students' mathematical concept understanding test results used inferential statistics. The test steps are: first, perform a normality test to see whether the data group comes from a normally distributed population. Second, perform a homogeneity test to see whether the data groups have the same variance. Third, conduct a t-test (different tests) to see the effectiveness of using digital comic teaching materials by students in the classroom.

RESULTS AND DISCUSSION

The steps to develop this research to improve the ability to understand mathematical concepts can be explained first in the stages of preliminary studies, development of teaching materials, validation of teaching materials by experts, testing of teaching materials, and implementing teaching materials. The implementation uses the experimental class design and the control class. The experimental and control class includes three schools located in the Genuksari area.

This study presents the results of the development and implementation of digital-based comic teaching materials to improve the ability to understand math concepts in fifth-grade elementary school students. The process of using the developed teaching materials begins with a validation test by experts, namely material experts, image and graphic design experts, and language experts, each of which involves 3 experts in each field of expertise. The objective of the expert's assessment is to assess the appropriateness of comic teaching materials in terms of content, presentation, legibility or language, layout, and animation. After that, continued with the user trial, namely the students. The aim is to see the feasibility of teaching materials from the user's side.

One of the most important student abilities in aspects that can affect learning outcomes is the ability to understand a concept (Syamsul, H: 2019). Referring to the casual research, in this study the ability to understand mathematical concepts using data analysis techniques in the form of statistical inferencing. The test steps are: first, perform a normality test to see whether the data group comes from a normally distributed population. Second, perform a homogeneity test to see whether the data groups have the same variance. Third, conduct a t-test (different tests) to see the effectiveness of using digital comic teaching materials by students in the classroom.

The results of the normality of the data on the ability to understand mathematical concepts that the results of students in the experimental class showed that Lo count = 0.01 <Lo table = 0.89 at $\alpha = 0.05$, which means that the data tested was normally distributed. While testing the data on the ability to understand mathematical concepts of students in the control class shows that Lo count = 0.10 <Lo table = 0.89, indicating that the normality of the data has been tested is normally distributed. While the homogeneity test aims to determine whether the research data has the same variance, by using the manual calculation of the Bartlett test at $\alpha = 0.05$. The test results of the students' ability to understand mathematical concepts in the experimental class and control class showed that Fount = 1.102 <Ftable = 1.6 at $\alpha = 0.05$. This means that the data variants of the experimental and control class/group data are homogeneous.

Hypothesis testing uses one-way analysis of variance (ANOVA) techniques (1X1) which aims to determine the main effect of teaching materials in the experimental class and teaching materials in the control class in increasing students' ability to understand mathematical concepts. The initial data source for the ANOVA calculation used the data score of the students' concept understanding ability in the experimental class and the control class. The results of hypothesis testing on the data on the ability of students to understand mathematical concepts show that Fount = 29.34> Ftable = 3.93 at the significance level $\alpha = 0.05$, then H0 is rejected and H1 is accepted. Thus there is a difference in the average score of students' knowledge between the experimental group and the control group.

The different test (t-test) is used to see the comparison of the two sample averages in the study, which means comparing the effectiveness of the developed model with the ongoing/conventional model. The results of the t-test calculation of the ability to understand mathematical concepts in the experimental class and control class are:

Table 1. The results of t-test data on the ability of students to understand mathematical concepts in the experimental and control classes.

Statistic	Experiment Class	Control Class
Number of samples (N samples)	58	54
Average (Mean)	22,74	8,46
Standard Deviation (SD)	1,74	2,03
Variance	3,04	4,14
T count	39,74	
T table (α = 0.05)	1,98	

Based on table 1, the results of the t-test on the students' ability to understand mathematical concepts show that t-count = 39.74> t-table = 1.98 at the significance level α = 0.05, then H0 is rejected and accepts H1. So it can be concluded, the test results of the ability to understand mathematical concepts from the experimental group were higher than the controversial group (which means that users of digital-based comic teaching materials were better than conventional books in increasing students' ability to understand mathematical concepts). Based on the results of the ability to understand mathematical concepts, the average score in the control class is lower than the experimental class with an average difference of 14. The results of the test of the ability to understand mathematical concepts on the indicators connect conceptual and procedural knowledge by defining the concept verbally having a range of processes in-class experiment and control class equal to 0.694.

The results of the first indicator analysis, namely using known facts and relationships to explain students' thoughts, obtained a percentage difference of 0.436. In the first indicator, students in describing the cubic space and cube nets are very good, besides that students already understand the elements in space, besides that students, can also distinguish between cube space shapes and other spatial shapes. In line with research (Auzar, 2017) that the ability to understand the language in math problems is related to the ability to read for understanding because both require the ability to understand a text. If students do not understand the text it means they cannot explain the text, for example, to complete the problem items described in math problems.

The second indicator is using known fact models and relationships to explain students' thinking. Students are able to determine the volume of the shape through the base area approach, unit cubes and students are able to describe the questions which are then converted into mathematical sentences. However, in this second indicator, there is an achievement of the same percentage, namely that in the control class and the experimental class, students can equally determine the volume of the shape through the base area and unit cube approach. Even so, on the second indicator, the percentage in the experimental class still shows higher results than the control class.

The results of research analysis (Rismawati, M & Hutagaol, 2018) show that the ability of students to understand mathematical concepts is still low, as evidenced by the low percentage of achievement of each indicator. The results of this study can provide information to lecturers about the ability of students to understand

mathematical concepts so that lecturers are expected to be able to design learning activities that can improve students' ability to understand mathematical concepts. Through interesting learning media, students can learn in a fun way and the learning that is created is also more meaningful. Fun and meaningful learning results in increased student achievement (Purnama & Mulyoto, 2015). One of the learning media used is learning media that can streamline the limited learning time, overcoming students' visualization skills about text material on human and environmental relations (Kustianingsari, 2015).

Supported by findings (Ruiyat, Yufiarti, & Karnadi, 2019). Speaking skills are one of the language developments that are developed in early childhood, as a communication tool and a means to express what students feel. Through thematic electronic comics can improve speaking skills in children, besides that the meaning of learning in children will be rooted strongly as shown when children recount their previous learning activities. Comic characters that visualize stories are seen as understandable by students, and also make it possible to connect scientific assignments with authentic situations taken from students' lives (Affeldt F, 2018). Comics are very efficient in communicating and are very effective to use in learning because they allow students to absorb learning concepts (Kurniawati, 2017).

It is necessary to develop digital comic media in accordance with the development of modern science and technology because digital comic media has kept up with the times and its use makes it easier for students. (Raneza, 2020). It is in line with the conversation (Ntobua, 2018) that children, including elementary school students, generally like illustrations and comics because they think it entertains them in reading as well as can unwittingly provide information related to the material they are learning.

In accordance with research (Dewantara, 2020) that there is a need for practice in communicating according to current education. Basic skills that need to be mastered by students are communication skills (Prabowo & Ariani, 2018). Comics are more effective in retaining knowledge to communicate verbally obtained by students (Zhang-Kennedy, Baig, & Chiasson, 2017). In line with research (Ariyanto & Laksana, 2018) educational comics are expected to contribute to the world of education. It is also emphasized in the research (Arini, Choiri & Sunardi, 2017) that through comics students can combine text with visual representations while teaching students while increasing student attention and participation because of the novelty of what they write.

CONCLUSION

The products produced in this study are digital-based comic teaching materials. The indicator of the ability to understand mathematical concepts used in this study is to use known facts and relationships to explain students 'thinking and to use known fact models and relationships to explain students' thinking. The novelty of this study is that the existence of digital-based comics, especially in mathematics, is very efficient to use, because through comic teaching materials students can communicate the material being studied according to the characters possessed by students so that through digital-based comic teaching materials it can improve their ability to understand mathematical concepts. students.

REFERENCES

Affeldt, F., Meinhart, D., & Eilks, I. (2018). The use of comics in experimental instructions in a non-formal chemistry learning context. *International Journal of Education in Mathematics, Science and Technology*, *6*(1), 93-104.

Arini, F. D., Choiri, A. S., & Sunardi. (2017). The Use of Comic As a Learning Aid To Improve Learning Interest of Slow Learner Student. European Journal of Special Education Research, 2(1), 71–78.

Ariyanto, A., & Laksana, S. (2018). Learning Social Sciences With Comic Strip. Westech, 8. https://doi.org/10.4108/eai.8-12-2018.2283992

Andreicheva, L., Latypov, R. (2015). Design of elearning systems: m-learning component. *Procedia-Social Behavioral Sciences 191*, 628-633.

Auzar, M. S. (2017). The Relationships of Reading Comprehension Ability with the Ability to Understand The Questions of Mathematical Word Problems. *Mediterranean Journal of Social Sciences*, *8*(4 S1), 145-15.

Dewantara, D. (2020). The influence of educational comics on the concept of static electricity toward student's learning outcomes and communication skills. *THABIEA: JOURNAL OF NATURAL SCIENCE TEACHING*, *3*(1), 20-30.

Hendriana, H. & Soemarno, U. (2014). *Penilaian pembelajaran matematika*. Bandung: Refika Aditama.

Heru Dwi Waluyo. (2005) Komik sebagai Media Komunikasi Visual Pembelajaran. Jurnal Nirmana Vol. 7 No. 1 Bulan Maret 2005.

Hobbs, R., & Moore, D. C. (2013). *Discovering media literacy: Teaching digital media and popular culture in elementary school*. Corwin Press.

Jannah, M., Prasojo, L. D., & Jerusalem, M. A. (2020). Elementary School Teachers' Perceptions of Digital Technology Based Learning in the 21st Century: Promoting Digital Technology as the Proponent Learning Tools. *Al Ibtida: Jurnal Pendidikan Guru MI*, *7*(1), 1-18.

J. E. Kemp and D. K. Dayton. (2010).Planning and Producing Introductional Media. New York: Harper&Row Publisher.

Jee, B. D., & Anggoro, F. K. (2012). Comic cognition: exploring the potential cognitive impacts of science comics. *Journal of Cognitive Education and Psychology*, *11*(2), 196-208.

Kurniawati, A. A., Wahyuni, S., & Putra, P. D. (2017). Utilizing of comic and jember's local wisdom as integrated science learning materials. *International Journal of Social Science and Humanity*, *7*(1), 47-50.

Kustianingsari, N. (2015). Pengembangan media komik digital pada mata pelajaran Bahasa Indonesia tema lingkungan sahabat kita materi teks cerita manusia dan lingkungan untuk siswa kelas V SDN Putat Jaya III/379 Surabaya. *Jurnal Mahasiswa Teknologi Pendidikan*, *6*(2), 1-9

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), 35-48.

Mawaddah, S., & Maryanti, R. (2016). Kemampuan pemahaman konsep matematis siswa SMP dalam pembelajaran menggunakan model penemuan terbimbing (discovery learning). *Edu-Mat: Jurnal Pendidikan Matematika*, *4*(1), 76 – 85.

Muchyidin, A. (2017). Pengaruh penggunaan bahan ajar matematika bersuplemen komik terhadap kemandirian belajar siswa. *Eduma: Mathematics Education Learning and Teaching*, *6*(1), 43-51.

NCTM. 2000. *Principles And Standards For School Mathematics*. *The United states of America*.

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.

Prabowo, C. A., & Ariani, N. L. (2018). Meningkatkan Keterampilan Komunikasi Oral Mahasiswa Melalui Strategi Pembelajaran Think Pair Share. BIOEDUKASI (Jurnal Pendidikan Biologi), 9(1), 57.

Prihandoko. (2006). *Pemahaman dan penyajian konsep matematika secara benar dan menarik*. Jakarta: Depdiknas.

Purnama, U. B., & Mulyoto, D. T. A. (2015). Penggunaan Media Komik Digital Dan Gambar Pengaruhnya Terhadap Prestasi Belajar IPA Ditinjau Dari Minat Belajar Siswa. *Jurnal TEKNODIKA*, *13*(2).

Raneza, F., & Widowati, H. (2020). Analisis Urgensi Pengembangan Komik Digital dengan Mengintegrasikan Nilai-Nilai Keislaman. Biolova, *1*(1), 13-18.

Rismawati, M., & Hutagaol, A. S. R. (2018). Analisis Kemampuan Pemahaman Konsep Matematika Mahasiswa PGSD STKIP Persada Khatulistiwa Sintang. *Jurnal Pendidikan Dasar Perkhasa: Jurnal Penelitian Pendidikan Dasar*, *4*(1), 91-105.

Rossana, L., Siswandari, S., & Sudiyanto, S. (2019). Development of Digital Comics Based on Problem Based Learning in Accounting Learning at Vocational Schools in Surakarta. *International Journal of English Literature and Social Sciences (IJELS)*, *4*(6). 2049- 2055.

Ruiyat, S. A., Yufiarti, Y., & Karnadi, K. (2019). Peningkatan Keterampilan Berbicara dengan Bercerita Menggunakan Komik Elektronik Tematik. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, *3*(2), 518-526.

Sudjana, N. dan Rivai, A., 2005, Media Pengajaran, Bandung: Sinar Baru Algesindo.

Suraji, S., Maimunah, M., & Saragih, S. (2018). Analisis kemampuan pemahaman konsep matematis dan kemampuan pemecahan masalah matematis siswa smp pada materi sistem persamaan linear dua variabel (SPLDV). *Suska Journal of Mathematics Education*, *4*(1), 9-16.

Syamsul, H., Lusi, A., Rizka Dwi, S., Muhamad, S., & Rofiqul, U. (2019). Learning model to improve the ability to understand mathematical concepts. *PRISMA*, *8*(2), 173-181.

Triono, J. (2014). Pengembangan bahan ajar akuntansi berbentuk komik digital pada materi siklus akuntansi perusahaan dagang. *Jurnal Pendidikan Akuntansi (JPAK)*, *2*(2).

Zhang-Kennedy, L., Baig, K., &Chiasson, S. (2017). Engaging children about online privacy through storytelling in an interactive comic.HCI 2017: Digital Make Believe - Proceedings of the 31st International BCS Human Computer Interaction Conference, HCI 2017, 2017-July, 1–11.

.

Improving the Ability of Understanding Mathematical Concepts through Digital-based Comics for Elementary School Students

ORIGINALITY REPORT

15%	8%	14%	5%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Yuvita Rama Yeni, Hendra Syarifuddin, Riska Ahmad. "The effect of contextual teaching and learning approach and motivation of learning on the ability of understanding the mathematics concepts of grade V student", IOP Conference Series: Earth and Environmental Science, 2019 Publication	2%
2	Submitted to Universitas Negeri Jakarta Student Paper	2%
3	ejournal.radenintan.ac.id Internet Source	1%
4	Winarti Dwi Febriani, Geri Syahril Sidik. "THE EFFECT OF REALISTIC MATHEMATICS EDUCATION (RME) ON THE UNDERSTAND MATHEMATICAL CONCEPTS SKILLS OF ELEMENTARY STUDENTS USING HYPOTHETICAL LEARNING TRAJECTORY (HLT)", PrimaryEdu - Journal of Primary Education, 2020 Publication	1%

5	www.scribd.com Internet Source	1%
6	docplayer.net Internet Source	1%
7	W F Rhamawati. "Metaphorical thinking approach assisted geogebra to improve connection mathematical ability of junior high school students", Journal of Physics: Conference Series, 2019 Publication	1%
8	Submitted to Universitas Pendidikan Indonesia Student Paper	1%
9	Rany Widyastuti, Suherman, Bambang Sri Anggoro, Hasan Sastra Negara, Mientarsih Dwi Yuliani, Taza Nur Utami. "Understanding Mathematical Concept: The Effect Of Savi Learning Model With Probing-Prompting Techniques Viewed From Self-Concept", Journal of Physics: Conference Series, 2020 Publication	1%
10	W Liliawati, Purwanto, A Zulfikar, R N Kamal. "The Effectiveness of learning materials based on multiple intelligence on the understanding of global warming", Journal of Physics: Conference Series, 2018 Publication	1%

11	Fourilla, A Fauzi. "Media analysis in development of physics e-module integrated with tsunami disaster", Journal of Physics: Conference Series, 2019 Publication	1%
12	www.mcser.org Internet Source	1%
13	U Lu'luilmaknun, D U Wutsqa. "Does the use of e-learning media with guided discovery method affect students' understanding of mathematics concept?", Journal of Physics: Conference Series, 2019 Publication	1%
14	L M Angraini, Y S Kusumah, J A Dahlan. "The Improvement of mathematical generalization reasoning of university students by concept attainment model", Journal of Physics: Conference Series, 2019 Publication	1%
15	W Ayuningtyas, Mardiyana, I Pramudya. "Analysis of student's geometry reasoning ability at senior high school", Journal of Physics: Conference Series, 2019 Publication	<1%
16	www.syekhnurjati.ac.id Internet Source	<1%

Exclude quotes	On	Exclude matches	< 20 words
Exclude bibliography	On		

Improving the Ability of Understanding Mathematical Concepts through Digital-based Comics for Elementary School Students

GRADEMARK REPORT

FINAL GRADE

/0

GENERAL COMMENTS

Instructor

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9

PAGE 10

PAGE 11