(JIML) JOURNAL OF INNOVATIVE MATHEMATICS LEARNING
Volume 7, No. 3, September 2024
P-ISSN 2621-4733
E-ISSN 2621-4741
https://dx.doi.org/10.22460/jiml.v7i3.p20529

THE DEVELOPMENT OF POWERPOINT-ASSISTED ALGEBRA LEARNING MEDIA TO INCREASE STUDENTS' MATHEMATICAL COMMUNICATION ABILITY ON JUNIOR HIGH SCHOOL

Iis Harisah[1], Ika Wahyu Anita[2], Euis Eti Rohaeti[3]

[1]IKIP Siliwangi, Jl. Terusan Jend. Sudirman, Cimahi, Indonesia.
iisharisah656@gmail.com
[2]IKIP Siliwangi, Jl. Terusan Jend. Sudirman, Cimahi, Indonesia.
ikawahyu@ikipsiliwangi.ac.id
[3]IKIP Siliwangi, Jl. Terusan Jend. Sudirman, Cimahi, Indonesia.
e2rht@ikipsiliwangi.ac.id

ARTICLE INFO

Article history:

Received Aug 31, 2023
Revised Sep 4, 2023
Accepted Oct 12, 2023

Keywords:

Mathematical Communication Ability
Powerpoint-Assisted Learning Media
Junior High School

ABSTRACT

The matter of algebraic form is crucial to study because the matter of the algebraical form is not only related to other mathematical matters but also related to everyday life, but there are still many students who have difficulty in communicating the explanation of the origin of the algebraic form. This is because the learning media used by the teacher is not interactive, so it affects the student's understanding and communication skills. For this reason, the study aims to cultivate the interest in learning and cultivate students' mathematical communication skills by developing algebraic learning media supported by a PowerPoint application. The method used in this research is research and development, with the development of a modified 4-D model in three stages namely determining, designing, and developing. The tool used to measure the quality of the learning media is a validation questionnaire for measuring the validity and student response to strengthen practicality. The results of this study show that the quality of the learning media meets the valid criteria with an overall average score of 79% and From the test carried out against students obtained an average scoring of 76%. Thus, the development of algebra learning media supported by the PowerPoint application has good quality and can be used in mathematical learning.

Copyright © 2024 IKIP Siliwangi.

All rights reserved.

Corresponding Author:

Iis Harisah,
Department of Mathematics Education,
Institut Keguruan dan Ilmu Pendidikan Siliwangi,
Jl. Terusan Jend. Sudirman, Cimahi, Indonesia
Email: iisharisah656@gmail.com

How to Cite:

Harisah, Iis., Anita, Ika Wahyu., Rohaeti, E Eti. (2024). The Development of Powerpoint-Assisted Algebra Learning Media to Increase Students' Mathematical Communication Ability on Junior High School. *JIML*, 7(3), 311-320.

INTRODUCTION

Understanding learning as a communicative process helps to recognize the importance of interaction, dialogue and information exchange between teachers and students to develop

understanding and knowledge (Hendrayady et al., 2023). So that students can apply in practice and convey what the teacher gives.

During the learning process, especially math subjects, many symbols and special symbols are used to convey concepts, formulas, and calculations (Yanti et al., 2019). Teachers have an important role in teaching students these symbols and how to use them correctly in a mathematical context, so that students can communicate their understanding effectively. For this reason, mathematical communication skills are necessary so that mathematical ideas are communicated without being misunderstood.

It has been reported in previous studies that students have difficulty communicating their ideas or thoughts, making them unable to solve the problems given to them. Of course, students' low levels of mathematical ability are related to their own mathematical communication skills (Marfiah & Pujiastuti, 2020). It has been found that many students have difficulty learning and think that mathematics is a boring subject and and difficulty in communicating mathematical ideas (Rachman et al., 2023). Algebra is one of the math subjects that is considered difficult. Algebra is an abstract mathematical material.

Algebra is considered the foundation of learning mathematics. If students do not master the basics of algebra well, it will be difficult to learn other subjects because mathematics is hierarchical (Sakiah & Effendi, 2021). With the discovery of many of these problems, as Istiani said in her research, Powerpoint media has been successful in improving students' communication skills (Novitasari et al., 2021). Therefore, it is necessary to innovate the process of learning algebra so that students can communicate mathematical ideas that contain many such symbols. One solution is to create the most engaging learning activities possible that can develop students' mathematical communication skills in math lessons, including the use of Powerpoint-enabled learning materials. support.

Interactive multimedia is the combination of images, videos, animations, and sounds in a single software that allows users to interact directly (Sina et al., 2019). According to (Kustandi & Darmawan, 2020) in their book, they state that media is a container for messages that the source wants to convey to the target or receiver of the message, the received material is a message. educational message and goal attainment is fulfillment. of the learning process. The success or failure of the learning process greatly affects the learning media used, because providing students with appropriate learning media during the learning process can have a positive effect because they Students are required to be active in learning activities. Murtikusuma's research (Atika, 2019) shows that learning materials that support PowerPoint applications meet the criteria of validity, practicality, and effectiveness. Learning media that supports PowerPoint applications can enhance students' interest and learning ability (Sa’dulloh, 2021). Therefore, it is necessary to research and develop learning materials with PowerPoint applications to develop communication skills for middle school students. PowerPoint can help teachers create interesting learning materials so that students do not get bored during the learning process (Hasibuan & Diahningsih, 2020).

Based on the above description, this study aims to demonstrate that it is necessary to have mathematics learning materials that match the needs and characteristics of students in order to foster mathematical communication skills. Mathematics is often considered a difficult,

complicated and boring subject, especially algebra, so it affects students' weak mathematical communication ability. To overcome this problem, teachers prepare interactive learning materials based on PowerPoint with interesting teaching methods that can develop students' math communication skills.

METHOD

The research method used is Research and Development with limited testing on math teachers and lecturers of the Faculty of Mathematics and Science Pedagogy in order to develop interactive learning materials and resources. PowerPoint-based algebra data to foster mathematical communication skills for students class VII.

The development of learning materials for algebraic material used in learning activities deals with Thiagarajan's 4D (Four-D) model that has been modified to 3D, namely definition, design and development (Syahri & Bahar, 2022) is described below:

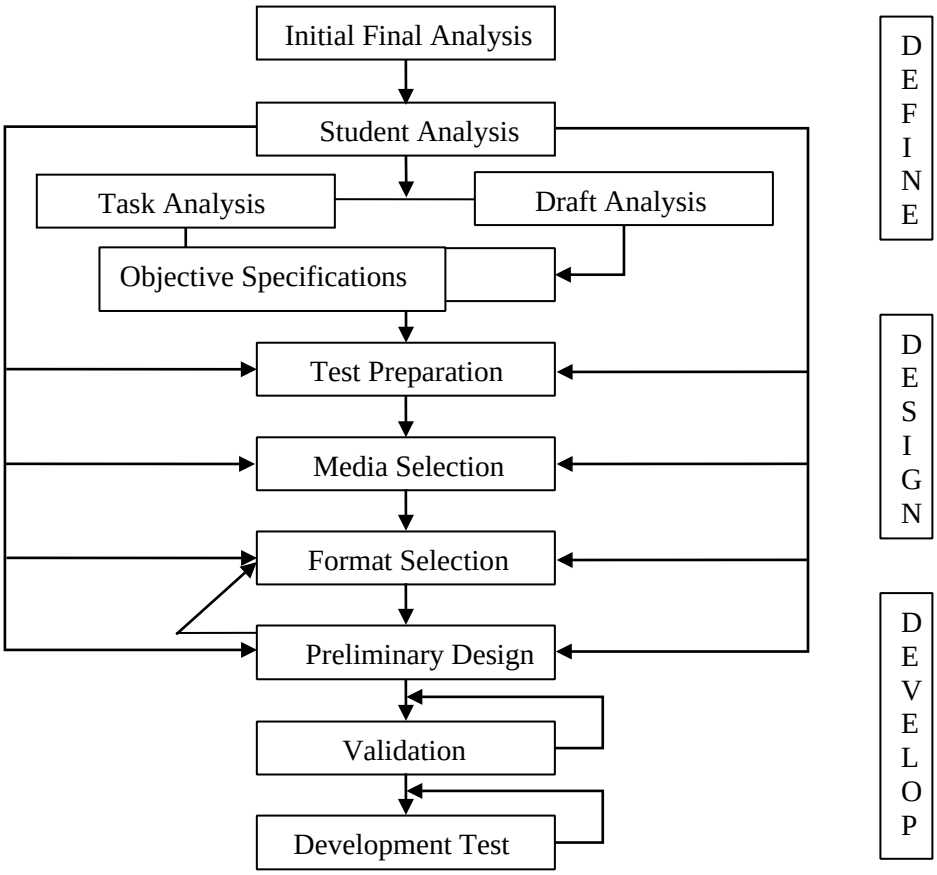

Figure 1. Learning Media Development Design

The learning material development stages have been developed through a series of stages as follows:

1. Difine Step

   The define step, or needs analysis, includes an initial analysis (initial analysis), document analysis, and analysis of the student's condition. The initial analysis includes a map of core competencies, indicators, and learning objectives. The basic skills related to algebraic material are 3.5 basic knowledge of explaining algebraic forms and operations on algebraic

forms (addition, subtraction, multiplication and division) and 4.5 solving math problems involves algebraic forms and operations on algebraic forms so that students can express mathematical modeling problems from story form to mathematical symbols, to be able to communicate them.

The results of the teacher interviews showed that: 1) Students lack interest in learning math. 2) Students have difficulty in conveying algebraic knowledge during math learning. Based on the analysis of students' conditions, it can be concluded that the difficulties in conveying material in the process of learning mathematics are due to the students' lack of interest in learning mathematics. Therefore, it is necessary to find a solution capable of enhancing students' interest in learning, namely building learning materials with PowerPoint applications to support.

2. Design Step

   At the design step, several steps can be prepared regarding the development of PowerPoint application-supported learning materials on algebraic materials. The main thing to do when designing is to prepare the Microsoft PowerPoint application in advance. Prepare an interactive PowerPoint that has three elements that are the introduction (introduction), body (document) and conclusion. In the Microsoft PowerPoint application, each slide can be linked to other slides by hyperlinks.

3. Develop Step

   During the development step, the creation of learning materials supported by the interactive PowerPoint application is done when the design comes to the formative phase.

The study was conducted at the junior high school of the Baitul 'Izzah Nusantara Islamic Boarding School and the instrument used in the study was a validation board to develop interactive learning media compiled on the basis of National Education Standards Agency (BSNP) (Nababan, 2019). This endorsement is used to obtain information on the quality and feasibility of study materials for essays based on the assessment of 3 validators with a split of 1 faculty verifier. Department of Mathematics and Mathematics. documentation specialist and 2 certified math teachers at Baitul 'Izzah Nusantara college, an Islamic boarding school who are specialists in communication and languages. The data information obtained through this validation board tool is used as input in the process of modifying the generated interactive learning material to obtain a suitable final product for use during the learning process.

The data analysis technique used in this study is descriptive statistical analysis which aims to describe the valid results given by validators after being validated. This validation table gives validators flexibility in evaluating interactive learning materials that have been developed and claimed to be viable if the validator's mean rating is classified as valid or very valid. The evaluation items are shown in Table 1.

Table 1. validation criteria (Ginting et al., 2021)

No.	Percentage (%)	Notes
1	80,00 – 100	Very Valid
2	60,00 – 79,99	Valid

3	50,00 – 59,99	Less Valid
4	0,00 – 49,99	Invalid

Limited data from trial results will be analyzed according to the evaluation guidelines that have been developed. The limit test results are calculated using Equation 1.

$$percent = \frac{earned\ value}{greatest\ value}\ x\ 100\%$$

RESULTS AND DISCUSSION

Results

This research aims to create interactive learning multimedia products that support PowerPoint. This study uses a 3D modified 4D research model, specifically Define, Design and Develop. The define step aims to analyze the program, needs and characteristics of students. The needs define step is performed to determine students' needs during the learning process. The needs analysis was carried out by distributing questionnaires to 10 students of Baitul 'Izzah Nusantara Islamic Boarding School. This analysis of student characteristics is carried out to determine the student's personality during the learning process using the developed learning materials. According to Piaget's theory, equipping students with learning materials is essential because they help students learn and understand learning quickly and easily. Based on the observation results, students are more interested in learning using media containing images, videos and practice questions at Baitul 'Izzah Nusantara Islamic Boarding School. The results of the activities at the define step, namely program analysis, are carried out by analyzing KI, KD and indicators contained in students' textbooks that can then be used as Instructions for developing materials on learning media.

The design step, the stage of preparing a media product, begins with preparing the application used to develop the product, specifically the PowerPoint application. Next, prepare the elements that will be displayed on the media, such as: writing documentary scripts, making videos, researching images, recording voice-overs in the media and preparing accompanying music for use in the media. The final step is to organize the media according to the initial project/design created at the ideation stage. This PowerPoint-supported interactive media includes:

1. Opening

Figure 1. Opening Display Of The Second And Third Slides

2. Content

Figure 2. Display Material Algebraic Forms

3. Closing

Figure 3. Closing Display in Last Slide

During the development step, the initial design was designed and then some modifications were made to the design as suggested by the supervisor. After the design was modified, the design was developed to become a PowerPoint-supported interactive learning medium on algebra materials and the medium was ready for use in the learning process. The developed product is then validated by the validator. This validation is intended to perfect the product being developed so that it is suitable for use in the learning process.

This learning material is compiled according to the standard of competency knowledge and basic skills in math with grade VII algebra material. This learning material has gone through the validation phase by three validators. Each validator is required to evaluate and provide PowerPoint-assisted learning materials for eligibility. The validation table used in this limited trial is based on the National Bureau of Educational Standards (BSNP) and has 5 aspects, namely the graphic feasibility aspect as assessed by media experts , the content eligibility aspect, the qualifying aspect presentation aspect, and the contextual eligibility aspect as assessed by the Experts document. and aspects of the language's feasibility as assessed by linguists (Batubara, 2018). You can see a summary of the percentages of points rated by validators based on the exposures described in Table 2.

Table 2. Recap of the percentage of aspect assessment scores by validators I, II and III

No	Assessment Aspect	Validator	percentage		criteria
			Σp	$\bar{p}$	
1.	Graphic Feasibility	1	80%	78%	Valid
		2	80%		
		3	75%		
2.	Content Suitability	1	80%	80%	Very Valid
		2	75%		
		3	85%		
3.	Appropriateness Of Presentation	1	55%	73%	Valid

		2	75%		
		3	90%		
		1	80%		
4.	Contextual Feasibility	2	75%	80%	Very Valid
		3	85%		
		1	85%		
5	Language Feasibility	2	80%	83%	Very Valid
		3	85%		
Average Total of All Aspects			**79%**		**Valid**

Based on test results conducted by researchers, average cores range from 80% to 100% with good/valid criteria, so interactive learning aids support the application. Using PowerPoint developed by researchers is feasible and good to use in the learning process because it has a beautiful, interesting format that makes it easy for students to understand the material (Cahyani & Putri, 2019).

Once the PowerPoint interactive learning media is validated against three validators and declared valid and practical for testing, then the next stage is product testing. Testing of the product will take place in the third week of July 2023 at Baitul ‘Izzah Nusantara Islamic Boarding School. The subjects of the test were 30 students on Junior High School. From the test carried out against 30 students obtained an average score of 76%, so that algebra material using learning media with the help of the PowerPoint application has met valid and practical criteria.

Discussions

This section of the research was carried out in Baitul ‘Izzah Nusantara Islamic Boarding School with the number of trial subjects as much as 30 students of class VII Junior High School. The main outcome of this research is the learning media supported by the PowerPoint application. This research applies 4D development stages according to Rosa (Mardiah & Rinaldi, 2018) has only been modified to 3D, namely definition, design and development (Syahri & Bahar, 2022). The disseminate step is not overshadowed as the test step already met the criteria of validity and practicality. As far as product development stages are concerned, they are as follows: (1) Define Step; (2) Design Step; and (3) Develop Step.

Based on the analysis of the condition of the student, the researchers assumed that the difficulty of understanding the subject matter was caused by the lack of interest in mathematics, so a solution was needed that could increase the interest of the pupil. Therefore, this interactive PowerPoint was developed to increase the interest of students to become more interested in mathematics lessons (Y. A. Dewi, 2019).

In the planning step there are several steps that are prepared in connection with the development of learning media using PowerPoint applications on algebraic materials, that is to say, the initial preparation. Where in this early preparation the researchers prepared the Microsoft PowerPoint application. As for the component of the PowerPoint compiler, it is divided into three parts, namely: opening, content and closing (Ratri et al., 2019). In addition to media planning, the researchers also prepared expert validation rafts and student responses related to the developed media.

Based on the results of the validation, three validators obtained a presentation of an average value of 79%, where the value belongs to the valid category and can be used without revision. This research is only until the develop step, the disseminate step is not overshadowed because at the test stage it already meets the criteria of valid and practical (Rachmawati & Kurniawati, 2020).

This study has similarities with the study (M. D. Dewi & Izzati, 2020), namely that it used the same variables as the learning materials that supported the PowerPoint application, except that both used the same method. 3D research method, Although her study used a modified 3D study method, it still included a final step that is disseminate step, whereas in my study this step was completely omitted and is consistent with what has been modified. While the difference between these two documents is that the research of Maharani Delta Dewi and Nur Izzati does not have the variable of mathematical communication ability, but in this study there is the variable of mathematical communication ability because This study is based on students' low mathematical communication ability. And the fundamental difference between these two lies in the difference between the object of study and the period of observation. Maharani Delta Dewi and Nur Izzati conducted research in 2020 on students at SMP Negeri 3 Tanjungpinang. Meanwhile, this study was conducted in 2023 on students of Baitul 'Izzah Nusantara boarding school.

CONCLUSION

Based on research and discussion results, it seems that interactive learning multimedia products for algebra literature are suitable for use by satisfying the 5 dimensions to be used as references for assessment. , which are graphic feasibility, content eligibility, presentation eligibility, contextual eligibility, and language eligibility. Based on validation, it is classified as valid and viable for use in the learning process to improve mathematical communication skills.

ACKNOWLEDGMENTS

The researchers would like to thank all the stakeholders involved in this study, especially the IKIP Siliwangi Institute and the 4th ISAMME Committee for providing guidance, documentation and language assistance to the identified experts. Get interactive learning materials, math professors and directors. of Baitul Islam. Boarding High School 'Izzah Nusantara' gave the researchers permission to conduct the study. The researcher hopes that this article can be useful to readers and other researchers.

REFERENCES

Atika, N. (2019). PERANGKAT PEMBELAJARAN MATEMATIKA PADA MATERI PROGRAM LINEAR UNTUK MENINGKATKAN KEMAMPUAN KOMUNIKASI MATEMATIS PESERTA DIDIK KELAS XI. *Seminar Nasional Pendidikan Matematika FKIP Universitas Islam Riau 2018*, 275–288.

Batubara, H. H. (2018). Pengembangan media pembelajaran matematika berbasis android untuk siswa SD/MI. *Muallimuna: Jurnal Madrasah Ibtidaiyah*, *3*(1), 12–27.

Cahyani, A., & Putri, S. O. (2019). Inovasi pendidikan melalui kemampuan berpikir kritis. *Prosiding Seminar Nasional Pendidikan FKIP*, *2*(1), 286–297.

Dewi, M. D., & Izzati, N. (2020). Pengembangan Media Pembelajaran PowerPoint Interaktif Berbasis RME Materi Aljabar Kelas VII SMP. *Delta: Jurnal Ilmiah Pendidikan Matematika*, *8*(2), 217. https://doi.org/10.31941/delta.v8i2.1039

Dewi, Y. A. (2019). Upaya Meningkatkan Minat Belajar Matematika Melalui Media Pembelajaran Berbantuan Komputer. *Desimal: Jurnal Matematika*, *2*(3), 211–231. https://doi.org/https://doi.org/10.24042/djm.v2i3.4830

Ginting, E. Y., Holiwarni, B., & Erviyenni, E. (2021). Pengembangan lembar kegiatan peserta didik berbasis model pembelajaran core pada materi kesetimbangan ion dan ph larutan penyangga. *Jurnal Pendidikan Kimia Universitas Riau*, *6*(2), 95–102. http://dx.doi.org/10.33578/jpk-unri.v6i2.7788

Hasibuan, D. T., & Diahningsih, R. H. (2020). Pengemasan Pembelajaran Tatak Tintoa Ser-Ser Dalam Media Pembelajaran Powerpoint Stand Alone untuk Siswa Kelas X SMA Di Medan. *Gesture: Jurnal Seni Tari*, *9*(2), 240–249.

Hendrayady, A., Sos, S., Azanda, S. H., Mamis, S., Kom, S. I., Kom, M. I., Hiswanti, S., Syarifuddin, M. I., Arini, D. U., & Sulistiani, I. (2023). *Mengenal Ilmu Komunikasi*. Cendikia Mulia Mandiri.

Kustandi, C., & Darmawan, D. (2020). *Pengembangan Media Pembelajaran: Konsep & Aplikasi Pengembangan Media Pembelajaran bagi Pendidik di Sekolah dan Masyrakat*. Prenada media.

Mardiah, S., & Rinaldi, A. (2018). Pengembangan modul pembelajaran matematika berbasis etnomatematika menggunakan metode inkuiri. *Desimal: Jurnal Matematika*, *1*(2), 119–126. https://doi.org/https://doi.org/10.24042/djm.v1i2.2228

Marfiah, D. Y., & Pujiastuti, H. (2020). Analisis Pengaruh Kecerdasan Intrapersonal Terhadap Kemampuan Komunikasi Matematis Siswa Pada Materi Bentuk Aljabar. *Al Khawarizmi: Jurnal Pendidikan Dan Pembelajaran Matematika*, *4*(1), 1–15. https://doi.org/http://dx.doi.org/10.22373/jppm.v4i1.6942

Nababan, S. N. (2019). *Pengembangan Media Pembelajaran Berbasis Website Pada Mata Kuliah Kewirausahaan untuk Mengetahui Konsep Keterampilan Berpikir Kreatif dan Manajerial Dalam Berwirausaha Mahasiswa Pendidikan Teknologi Agroindustri*. Universitas Pendidikan Indonesia. http://repository.upi.edu/id/eprint/40694

Novitasari, I. I., Utami, R. D., & Sehati, A. (2021). Penggunaan Media Pembelajaran Power Point Interaktif Dalam Meningkatkan Kemampuan Komunikasi Peserta Didik. *Educatif Journal of Education Research*, *3*(4), 61–69.

Rachman, M. A., Rahmawati, A., Jeni, S. S., & Rahayu, R. (2023). PENGARUH MEDIA PEMBELAJARAN UNTUK MENGATASI KESULITAN BELAJAR SISWA PADA PEMBELAJARAN MATEMATIKA SATUAN PANJANG DI SDN LEMAHDUHUR II. *Jurnal Pendidikan Dasar Rare Pustaka*, *5*(1), 32–41. https://doi.org/https://doi.org/10.59789/rarepustaka.v5i1.153

Rachmawati, R., & Kurniawati, A. (2020). Pengembangan Instrumen Penilaian Tes Berbasis Mobile Online pada Prodi Pendidikan Matematika. *Prima: Jurnal Pendidikan Matematika*, *4*(1), 46–63. https://doi.org/http://dx.doi.org/10.31000/prima.v4i1.1891

Ratri, S., Agus, S., Rosida, R., & Rubhan, M. (2019). Pengembangan media pembelajaran matematika modul bilingual bergambar berbasis kewirausahaan pada aritmetik sosial. *Journal of Mathematics Education and Science*, *2*(1), 1–9. https://doi.org/https://doi.org/10.32665/james.v2i1.46

Sa'dulloh, M. (2021). Implementasi Problem Based Learning berbantuan Media Power Point untuk Meningkatkan Hasil Belajar tentang Hak dan Kewajiban terhadap Tumbuhan pada Siswa Kelas IV Semester I SDN Sutopati 5 Tahun Ajaran 2020/2021. *Educatif Journal of Education Research*, *3*(1), 90–99. https://doi.org/https://doi.org/10.36654/educatif.v3i1.40

Sakiah, N. A., & Effendi, K. N. S. (2021). Analisis kebutuhan multimedia interaktif berbasis PowerPoint materi aljabar pada pembelajaran matematika SMP. *JP3M (Jurnal Penelitian Pendidikan Dan Pengajaran Matematika)*, *7*(1), 39–48.

Sina, I., Farlina, E., Sukandar, S., & Kariadinata, R. (2019). Pengaruh Multimedia Interaktif dalam Pembelajaran Matematika Terhadap Kemampuan Komunikasi Matematis Siswa. *Suska Journal of Mathematics Education*, *5*(1), 57–67.

Syahri, A. A., & Bahar, E. E. (2022). Pengembangan Perangkat Pembelajaran Matematika Realistik pada Materi Operasi Hitung Bentuk Aljabar. *Aksioma*, *11*(1), 8–20.

Yanti, R. N., Melati, A. S., & Zanty, L. S. (2019). Analisis kemampuan pemahaman dan kemampuan komunikasi matematis siswa smp pada materi relasi dan fungsi. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, *3*(1), 209–219. https://doi.org/https://doi.org/10.31004/cendekia.v3i1.95