

THE IMPACT OF INTERACTIVE POWERPOINT-ASSISTED COLLABORATIVE LEARNING ON MATHEMATICS LEARNING OUTCOMES

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ABSTRACT

The purpose of this study was to determine whether there was an effect of the application of the collaborative learning assisted by Microsoft Powerpoint Interactive media on the learning outcomes of class VII students of SMP Negeri 1 Putra Rumbia. This research includes a quasi-experiment which was conducted in class VII at SMP Negeri Putra Rumbia. The subjects of this study were students of class VII A as the experimental class and class VII C as the control class. The data collection technique used is a test. The test instrument used is 7 items of description. Based on the calculation of the hypothesis test using the t-test (two parties) which resulted in $t_{count} = 5,68$ and $t_{table} = 1,99$. There is a difference in the average mathematics learning outcomes of students using the interactive Microsoft Powerpoint-assisted Collaborative Learning method, which is not the same as the average mathematics learning outcomes of students using conventional methods. So it can be concluded that there is an effect of applying Collaborative Learning Method assisted by Microsoft Powerpoint Interactive media on the learning outcomes of class VII students of SMP Negeri 1 Putra Rumbia.

Keywords : collaborative learning, interactive microsoft powerpoint, learning outcomes.

ABSTRAK

Tujuan penelitian ini adalah untuk mengetahui apakah terdapat pengaruh penerapan metode collaborative learning berbantu media Microsoft Powerpoint interaktif terhadap hasil belajar peserta didik kelas VII SMP Negeri 1 Putra Rumbia. Penelitian ini termasuk eksperimen semu yang dilakukan pada kelas VII di SMP Negeri Putra Rumbia. Sampel penelitian ini adalah peserta didik kelas VII A sebagai kelas eksperimen dan kelas VII C sebagai kelas kontrol. Teknik pengumpulan data yang digunakan adalah tes. Instrumen tes yang digunakan adalah 7 butir soal uraian. Berdasarkan perhitungan uji hipotesis yang menggunakan uji-t (dua pihak) yang menghasilkan $t_{hitung} = 5,68$ dan $t_{tabel} = 1,99$. Hal ini menunjukkan terdapat perbedaan rata-rata hasil belajar matematika peserta didik yang menggunakan metode Collaborative Learning berbantu Microsoft Powepoint interaktif dan rata – rata hasil belajar matematika peseta didik yang menggunakan metode konvensional. Sehingga dapat disimpulkan bahwa terdapat pengaruh penerapan metode collaborative learning berbantu media Microsoft Powerpoint Interaktif terhadap hasil belajar peserta didik kelas VII SMP Negeri 1 Putra Rumbia.

Kata Kunci : collaborative learning,, microsoft powerpoint interaktif, hasil belajar.



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Introduction

Mathematics is one of the subjects that must be given to all students from elementary school to secondary level, this is because of the importance of

mathematics can solve problems in daily life (Putra, 2016). Learning mathematics requires the readiness of students both from internal and external factors (Uliah et al., 2019). This is because mathematics is a learning that is systematically arranged and requires logical reasoning, so if the mathematics learning process is not supported by these two factors, it will be an obstacle when learning mathematics (Fitriyanti et al., 2021). The success or failure of the mathematics learning process can be measured from the learning outcomes of students according to the explanation of Sjukur (2012) "learning outcomes are one of the abilities achieved by students after the learning process, it can be seen in changes in behavior such as knowledge, understanding, concepts, attitudes, and learning skills of students for the better".

The researcher conducted an interview with an educator of Grade VII mathematics subject at SMP Negeri 1 Putra Rumbia obtained information that in the learning process educators use conventional methods, namely educators still use the lecture method in learning, the lecture method makes students' activities tend to take more notes, memorize, and do problems, this is done in every learning process so that students feel bored, not enthusiastic in learning and finally the learning process becomes monotonous, causing students' learning outcomes to be less than optimal. This can be seen from the learning results found in schools there are still many students who have not reached the minimum completeness criteria standards, this can be seen from the Mid-Semester Exam scores. The result of the analysis can be shown in Table 1.

Table 1. Data on the completeness of the learning outcomes of the mid-semester exam for mathematics subject class VII

No	Minimum Completeness Criteria	Class			Sum	%
		VII A	VII B	VII C		
1	Tuntas ≥ 65	13	10	13	36	37,5%
2	Tidak Tuntas < 65	19	22	19	60	62,5%
	Sum	32	32	32	96	100%

Based on the Table 1, it can be seen that there are still many students who have not completed mathematics subjects as many as 60 students out of 92 students with a percentage score of 62.5%. The number of students who have not completed is more than 50%, in this case it is necessary to improve the learning outcomes of students who are not complete. The role of educators is one of the determining factors for student learning outcomes. Educators are required to be creative and critical in the learning process, one of which is by using learning methods that can create new innovations in the learning process. With the use of appropriate learning methods, it will make the learning process more effective. An effective learning process is expected to enable students to achieve completeness in the learning process. One of the learning methods that can be applied is the collaborative learning method.

The collaborative learning is a group learning process in which each member actively contributes information, experiences, ideas, attitudes, opinions, abilities, and skills to improve mutual understanding (Maarif and Desiningrum, 2013). The advantages of the Collaborative Learning are that it can stimulate students' creativity, expand students' understanding, increase cooperation, and

encourage students to learn in groups. So that the use of *the* Collaborative Learning is very effective in the learning process (Lisandi & Leksono, 2019). Based on research that has been conducted by Meilasari (2019), it can be concluded that the application of iSpring Presenter Assisted collaborative learning to the Learning Outcomes of the Linear Program of the collaborative process makes students more active in discussing in learning compared to the use of previous methods. Furthermore, with the help of iSpring presenter media which makes teaching materials more interesting and easy to distribute, it fosters student interest and ease of access, but there is a weakness in iSpring presenters, namely that in the old version of iSpring it cannot stand *alone* and only functions as a *plug* in powerpoint even though in the latest version of iSpring it is already stand alone (stand-alone) but still very dependent on PowerPoint, even though iSpring is already stand-alone, iSpring's functionality will be maximized if it lives with PowerPoint (Maryana, 2019).

The Collaborative Learning can encourage users to communicate with each other, express responses to questions, work in different opinions and write conclusions clearly (Wibowo & Pardede, 2019). In this learning process, students are required to play an active role in the form of learning together or in groups. In the learning process, educators only become facilitators and help students if there are difficulties. The learning process with this method emphasizes cooperation, good mutual interaction so that the learning process becomes more effective and efficient. In addition to the use of learning methods, the use of learning media also affects the learning process. Learning media is everything that can be used to channel messages (learning materials), so that it can attract the attention, interests, thoughts and feelings of students in learning activities to achieve certain learning goals in accordance with the explanation of Rusman et al. (2019) stating that "Learning media is everything that is used to channel messages and can stimulate the mind, feelings of attention and willingness to learn so that they can encourage a deliberate, purposeful and controlled learning process.

The use of learning media can help students to better understand the subject matter delivered by educators. There are many types of learning media that are very effective and efficient in learning. One example of learning media in visual form is *the* Microsoft Powerpoint Interactive learning media (Damayanti & Qohar, 2019). Based on research that has been conducted by Ekaningtias & Safilin (2019), this study explains that the influence of interactive multimedia based on Microsoft PowerPoint shows a significant influence on improving student learning outcomes. The use of Microsoft Powerpoint Interactive media is because it is more practical, and also has a variety of presentations with various color combinations or animations and can even insert several videos to make it look more interesting (Nurhayati et al., 2020). This can certainly attract students to be easier to understand the subject matter.

Based on the problems described above, the purpose of this study is to determine the effect of the application of the collaborative learning assisted by interactive microsoft powerpoint media on the mathematics learning outcomes of grade VII students at SMP Negeri 1 Putra Rumbia.

Research Methods

The research method used in this study is a pseudo-experimental research method with a non-equivalent form of control group design. In this study, it is quantitative, aiming to improve students' mathematics learning outcomes. In this study, the type of research that will be conducted is comparison, where the researcher uses two methods in learning. The implementation process is divided into 2 groups consisting of 2 classes, namely the experimental class and the control class. The experimental class uses the Collaborative Learning method, while the control class uses the conventional method. The population in this study is all grade VII students at SMP Negeri 1 Putra Rumbia for the 2021/2022 school year which consists of 3 classes and totals 96 people. The technique used for sample selection is the purposive random sampling technique. The sample in this study was students of class VII A as an experimental class and class VII C as a control class at SMP Negeri 1 Putra Rumbia. With the number of students, 32 students in the experimental class and 32 students in the control class.

The data collection technique used is a test. The test instrument in this study was used to measure the success in the learning process that had been carried out previously using the applied learning methods. The test questions used in this study are questions in the form of descriptions with a total of 7 questions. In this study, the questions were validated by 3 validators, namely 1 lecturer of the mathematics education study program and 2 educators of mathematics subjects of SMP Negeri 1 Putra Rumbia to find out the content of the research instrument. Assuming that the mathematics subject educators of SMP Negeri 1 Putra Rumbia and lecturers of the UM Metro mathematics education study program know the curriculum and the material being taught, the validation of the research instrument is based on the assessment of the validator. The test instrument is said to be reliable if the reliability level of the test > 0.40 , because the reliability in this study is $r_{11} = 0.63$ so that it is included in the high category, then the test questions are said to be reliable or adequate.

The data analysis techniques used in this study are normality tests and homogeneity tests. The posttest score data of the experimental class and the control class were analyzed using an average two-point similarity test. Before conducting the hypothesis test, a prerequisite test was carried out, namely the normality test and the homogeneity test. After the normality test and homogeneity test were carried out, it was obtained that the sample from the normally distributed population was homogeneous so that the hypothesis test used was the t-test.

Results and Discussion

The results of this study are data in the form of scores obtained from the results of the pretest and posttest from the experimental class and the control class. The results of pretest of students in experimental and control class on the subject of social arithmetic can shown in Table 2.

Table 2. The results of pretest of students in experiment and control classes

NO	Group	N	Xmin	Xmax	\bar{X}	SD
1.	Eksperiment	32	15	57	35,46	13,38
2.	Control	32	15	55	33,46	11,56

Based on Table 2, it can be seen that the initial ability of students in class VIIA (experiment class) obtained the highest score of 57 and the lowest score of 15 with an average class of 35,46. Meanwhile, the initial ability in class VIIC (control class) obtained the highest score of 55 and the lowest score of 15 with an average class of 33,46. The results of posttest of students in experiment and control classes can be shown in Table 3.

Table 3. The results of posttest of students in experiment and control classes

No	Group	N	Xmin	Xmax	\bar{X}	SD
1.	Experiment	32	40	80	66,87	11,48
2.	Control	32	25	75	48,28	14,51

Based on Table 3, it is known that the final ability of mathematics learning outcomes in class VIIA (experimental class), obtained the highest score of 80 and the lowest score of 40 with a class average of 66,87. Meanwhile, the final ability of the learning outcomes of class VIIC (control class) was obtained with the highest score of 75 and the lowest score of 25 with an average class of 48,28.

Before hypothesis testing, the posttest data score was carried out a prerequisite test, namely the normality and homogeneity test. The normality test results for the experimental and control class final tests are presented in Table 4.

Table 4. Normality test results of experimental class and final test control class

No	Class	Average	Count	Table	Test Results
1	Experiment	66,87	0,12	0,15	H ₀ accepted
2	Control	48,28	0,15	0,15	H ₀ accepted

Based on the Table 4, it is known that the experimental class at the level of significance shows that it is outside the critical area, this shows that $L_{count} < L_{table}$, H₀ is accepted. This indicates that both the control and experimental classes come from a normally distributed population. Results of the homogeneity test for experimental and control class final tests can be shown in Table 5.

Table 5. Results of the homogeneity test for experimental and control class final tests

No	Class	Average	χ^2_{count}	χ^2_{table}	Test Results
1	Experiment	66,875	1,50	3,84	H ₀ accepted
2	Control	48,28125			

Based on the table 5, it is known that the results of the homogeneity test at a significant level = 0.05 show that it is $\chi^2_{count} < \chi^2_{table}$, so that χ^2 it is outside the critical area. This shows that H₀ is accepted, which means that both samples come from homogeneous populations or have the same variance. After the prerequisite

tests are met, the hypothesis is then tested on the posttest data. The results of the hypothesis test for the experimental and control classes can be seen in Table 6.

Table 6. The results of the hypothesis test for the experimental and control classes

No	Class	n	n-1	t _{count}	t _{table}	Test results
1	Experiment	32	31	5,68	1,99	H ₀ Rejected
2	Control	32	31			

Based on Table 6, the hypothesis testing shows that $t_{count} (5.68) \neq t_{table}(1.99)$, meaning the null hypothesis is rejected. This indicates that there is a difference in the average mathematics learning outcomes between students who used the interactive Microsoft PowerPoint-assisted collaborative learning method and those who used conventional methods. Therefore, the application of the collaborative learning method assisted by interactive Microsoft PowerPoint has a significant effect on the mathematics learning outcomes of Grade VII students at SMP Negeri 1 Putra Rumbia

Based on the results obtained from research at SMP Negeri 1 Putra Rumbia, namely the results of the posttest, it can be seen that in the experimental class the average mathematics learning result was 66.87 while in the control class the average mathematics learning result was 48.28. This shows that the average mathematics learning outcomes using the Collaborative Learning method assisted by Microsoft PowerPoint Interactive media are higher than the average mathematics learning outcomes using conventional methods.

Based on the calculation of the hypothesis test using the t-test (two-sided) which produces $t_{hitung} = 5,68$ and in the $t_{table} = 1,99$ test criteria, the significance level = 0.05 so that $-t_{(a,n_1+n_2-2)} < t_{count} < t_{(a,n_1+n_2-2)}$ the meaning of rejection and acceptance and shows that there is a difference in the average mathematics learning outcomes of students who use the interactive Microsoft PowerPoint assisted Collaborative Learning method is not the same as the average mathematics learning outcomes of students who use conventional methods. So there is an effect of the application of the Collaborative Learning Method assisted by Microsoft PowerPoint Interactive media on students' mathematics learning outcomes. This is in accordance with the hypothesis expressed before conducting the research, namely the effect of the application of the Collaborative Learning method assisted by Microsoft PowerPoint Interactive media on the mathematics learning outcomes of grade VII students of SMP Negeri 1 Putra Rumbia. The difference in learning outcomes is due to the different treatment given to each class.

For the application of the Collaborative Learning method assisted by interactive Microsoft Powepoint media in this study, before the learning process begins, the first step taken by educators is that educators first provide an explanation of learning using the Collaborative Learning method and the things that must be done by students. The second step is to divide students into several groups where each group consists of 5-6 people. The third step is for educators to give problems to each group made in the form of student worksheet.

Before students discuss solving the problems that have been given, educators first explain the content of the material according to the problems given using interactive Microsoft PowerPoint media (Sakiah & Effendi, 2021).

PowerPoint media makes it easier to deliver material and makes students more active, independent, and motivated in learning mathematics (Kurniawan et al., 2020). After the educator finishes explaining the learning material, students are given time to discuss solving problems in the student worksheet, then the educator guides and directs students if in solving the students worksheet experience difficulties. Thus, students can easily learn social arithmetic material. Each group is responsible for providing understanding to fellow group members who do not understand. Each group that already understands can present it in front of the class explaining to the group that does not understand. This is in accordance with the opinion of Anawati & Isnaningrum (2019) that Collaborative Learning helps students understand theoretical concepts in which each member contributes information, experiences, ideas, attitudes, opinions, abilities, and skills, to jointly improve the understanding of all members or develop a final process that is usually more specific.

In classes that carry out learning using the Collaborative Learning method with the help of interactive Microsoft PowerPoint media, students are more active because they participate directly in the learning process in accordance with the subject topic taught, namely social arithmetic. Students look for and find concepts of problems based on the LKPD (Students worksheet) given by educators. This is in accordance with the opinion of Dermawan (2014) stating that collaborative learning is one of the learning methods that can develop students' active participation. Collaborative learning provides opportunities for students to be more active in managing their thinking, so that they do not only depend on the teacher's explanation (Inah & Pertiwi, 2017). Learning using the Collaborative Learning method of time management must be good so that learning can run as planned because at the appropriateness stage, educators focus assistance on things that students do not know optimally (Van Leeuwen & Janssen, 2019). So, in learning, educators must focus more on something that students do not yet know, so educators must be diligent in guiding students. So it requires good supervision from educators, because if good supervision is not carried out, the collaboration process will not be effective (Handayani, 2019). The use of interactive PowerPoint media in the Collaborative Learning method can motivate students to be more active and improve learning outcomes, as long as it is supported by good time management and teacher supervision so that learning can run according to plans and goals are achieved. This media not only presents valid and practical material, but also encourages direct involvement of students in learning social arithmetic through concepts that are invented by themselves with the help of interesting visuals and animations (Mutia & Mulyawati, 2021).

For learning in the control class during research, the method used is the conventional method, in this method only the lecture and discussion method is used. According to Mahendra et al. (2018) in the learning process using conventional methods, educators explain the material orally making the learning process monotonous, uninteresting, so that it makes students feel bored, students who do not pay attention just play around in class because they are not enthusiastic about learning, and are not interested in learning, ultimately making students' learning outcomes less than optimal. This is in accordance with the opinion of Hibattulloh & Sofyan (2014) stating that "the conventional method is a

classical learning method that satisfies the teacher or in other words the teacher as the subject of the student as the object of learning". In this method, after the educator finishes delivering the learning material, the educator gives the question, but in solving the problem students find it difficult to solve it, because the process of learning activities is monotonous, and less interesting, making many students not pay attention to the educator when delivering the learning material so that when given practice questions students cannot do (Suhendri & Werdiningsih, 2019).

Based on the description above, it is clear that the Collaborative Learning method with the help of interactive Microsoft PowerPoint media on the subject of social arithmetic, which is applied to the learning process in research at SMP Negeri 1 Putra Rumbia has a positive impact on students, namely students play a more active role in the learning process by asking questions about material that is not yet understood and can cooperate with group mates in completing the assignments given by the educator, and can be responsible for the tasks they complete, so that students look more enthusiastic in learning and able to improve students' mathematics learning outcomes and can be used as an alternative to improve the quality of learning that may be carried out in the classroom.

Based on the results of statistical tests, the average score of the final test results in the experimental class using the Collaborative Learning method with the help of interactive Microsoft PowerPoint media was higher than that of the control class students who used the conventional method. Thus, it can be concluded that there is an effect of the application of the Collaborative Learning method assisted by Microsoft Powerpoint Interactive media on the mathematics learning outcomes of grade VII students of SMP Negeri 1 Putra Rumbia. This is in line with research conducted by (Meilasari, 2019) regarding the Collaborative Learning learning method, that the application of the Collaborative Learning method makes students more active in discussing in learning compared to the use of the previous method, namely the conventional method.

Conclusion and Suggestion

Based on the results of the research and discussion, it can be seen from the results of the analysis of the hypothesis test of students' learning outcomes, namely the similarity test of the two averages where $t_{count} = 5,68$ and with a level of significance $t_{tabel} = 1,99a = 0.05$ shows that $t_{count}(5,68) \neq t_{tabel}(1,99)$. So it can be concluded that there is an effect of the application of the Collaborative Learning method assisted by interactive Microsoft Powerpoint media on the mathematics learning outcomes of grade VII students at SMP Negeri 1 Putra Rumbia.

Based on the research that has been conducted, the researcher has several suggestions, namely (1) For the school, it should enrich the knowledge about various learning methods, ways to apply and develop them for students. So that it is able to create active, innovative, creative, effective, and fun mathematics learning, especially in the Collaborative Learning method assisted by Microsoft Powerpoint Interactive media in mathematics learning. (2) For educators, it is important to choose a learning method that is in accordance with the subject matter so that the learning process is more interesting and effective. One of them that can be used as an alternative is using the Collaborative Learning method

assisted by Microsoft Powerpoint Interactive media to create active, innovative, creative, effective, and fun mathematics learning. (3) For students, they should always be active and disciplined in learning so that what they learn can be useful for themselves and the people around them. (4) For other researchers, it is possible to conduct further research on learning using the Collaborative Learning method assisted by Microsoft Powerpoint Interactive media on other aspects besides learning outcomes and applied to materials other than social arithmetic. In addition, you don't have to use Microsoft Powerpoint Interactive media but can use other media.

Reference

- Anawati, S., & Isnaningrum, I. (2019). Model Pembelajaran Collaborative Learning tipe Reciprocal Teaching pada Pembelajaran Matematika. *Diskusi Panel Nasional Pendidikan Matematika*, 5(1), 477-452. <https://proceeding.unindra.ac.id/index.php/DPNPMunindra/article/view/613>
- Anwar, M. S., Choirudin, C., Ningsih, E. F., Dewi, T., & Maselena, A. (2019). Developing an Interactive Mathematics Multimedia Learning Based On Ispring Presenter In Increasing Students' Interest In Learning Mathematics. *Al-Jabar: Jurnal Pendidikan Matematika*, 10(1), 135-150. <https://doi.org/10.24042/ajpm.v10i1.4445>
- Damayanti, P. A., & Qohar, A. (2019). Pengembangan Media Pembelajaran Matematika Interaktif Berbasis Powerpoint Pada Materi Kerucut. *Kreano, Jurnal Matematika Kreatif-Inovatif*, 10(2), 119-124. <https://doi.org/10.15294/kreano.v10i2.16814>
- Dermawan, A. (2014). Keefektifan Collaborative Learning Berbasis Quiz Edutainment Terhadap Ketuntasan Hasil Belajar. *Chemistry in Education*, 3(1), 57-63. <https://journal.unnes.ac.id/sju/chemined/article/view/1831>
- Ekaningtias, M., dan Safilin, N. (2019). Pengaruh Multimedia Interaktif Berbasis Microsoft Power Point Terhadap Hasil Belajar Siswa Kelas VIII MTS Nurul Falah NW Lajut Tahun Pelajaran 2019/2020. *Jupe: Jurnal Pendidikan Mandala*, 4(5), 232-235. <https://doi.org/10.36312/jupe.v4i5.866>
- Fitriyanti, F., Laras, I. S., Khasanah, K., Anita, I. D., & Rahmawati, F. (2021). Implementasi Metode Collaborative Learning Dalam Pembelajaran Statistika Untuk Meningkatkan Keterampilan 4C (Critical And Problem Solving Skills, Collaboration Skills, Communication Skills, And Creativity And Innovation Skills) Pada Siswa Kelas XI. *Edunesia: Jurnal Ilmiah Pendidikan*, 2(1), 249-259. <https://edunesia.org/index.php/edu/article/view/115>
- Handayani, R. (2019). Efektivitas pembelajaran kolaboratif pada mata kuliah pembelajaran matematika berbasis informatika. *Eksponen*, 9(2), 45-51. <https://doi.org/10.47637/eksponen.v9i2.59>
- Hibattulloh, N., dan Sofyan, D. (2014). Perbandingan Kemampuan Komunikasi Matematis Siswa Antara yang Menggunakan Model Pembelajaran Kooperatif Tipe Jigsaw dengan Konvensional. *Mosharafa: Jurnal Pendidikan Matematika*, 3(3), 169-178.

<https://www.neliti.com/id/publications/226579/perbandingan-kemampuan-komunikasi-matematis-siswa-antara-yang-menggunakan-model>

- Inah, E. N., dan Pertiwi, U. A. (2017). Penerapan Collaborative Learning Melalui Permainan Mencari Gambar untuk Meningkatkan Hasil Belajar IPA Kelas V Di SDN Tabanggele Kecamatan Anggalomoare Kabupaten Konawe. *AL-TA'DIB: Jurnal Kajian Ilmu Kependidikan*, 10(1), 19-36. <https://media.neliti.com/media/publications/235725-penerapan-collaborative-learning-melalui-ea71b7e6.pdf>.
- Kurniawan, D., Wahyuningsih, T., & Sari, D. N. (2020). Pengaruh model pembelajaran kooperatif tipe think pair share dengan menggunakan power point terhadap hasil belajar matematika. *Jurnal Pendidikan Matematika(Kudus)*, 3(1),59-72. <http://dx.doi.org/10.21043/jpm.v3i1.7149>
- Lisandi, R., & Leksono, I. P. (2019). Pengaruh Penggunaan Cooperative Learning, Collaborative Learning Dan Gaya Kognitif Terhadap Hasil Belajar Siswa Kelas Vii Di SMP Sepuluh Nopember Sidoarjo dan SMP N 1 Buduran Sidoarjo. *Jurnal Education And Development*, 7(2), 196-196. <https://doi.org/10.37081/ed.v7i2.940>.
- Maarif, S., dan Desiningrum, N. 2013. Pengembangan Model Pembelajaran Collaborative Learning Dengan Pendekatan Out-Door Study Terhadap Pemahaman Mata Kuliah Statistika Mahasiswa Pendidikan Bahasa Indonesia Stkip Bina Insan Mandiri Surabaya. *Jurnal Media Pendidikan Matematika*, 1(2), 137-144. <https://doi.org/10.33394/mpm.v1i2.1882>.
- Mahendra, I., Jayantika, I. G. A. N., & Mintarti, N. G. P. (2018). Pengaruh Model Pembelajaran Kolaboratif Terhadap Hasil Belajar Matematika dengan Mengontrol Bakat Numerik Peserta Didik. *Journal of Songke Math*, 1(1), 26-36. <https://doi.org/10.59672/senama.v1i0.326>.
- Maryana, M. (2019). Pengembangan Media Pembelajaran Matematika Menggunakan Powerpoint dan Ispring Quizmaker Pada Materi Teorema Pythagoras. *Proximal: Jurnal Penelitian Matematika dan Pendidikan Matematika*, 2(2). <https://www.e-journal.my.id/proximal/article/view/229>
- Meilasari, V. (2019). Pengaruh Penerapan Collaborative Learning Berbantu Ispring Presenter terhadap Hasil Belajar Program Linear. *Jurnal Eksponen*, 9(2), 52-58. <https://jurnal.umko.ac.id/index.php/eksponen/article/view/60>
- Mutia, W. S., & Mulyawati, I. (2021). Pengembangan Media Pembelajaran Matematika Pada Materi Bangun Ruang Melalui Animasi Power Point Terhadap Siswa Kelas V SDN Parung Panjang 06. *Elementary School: Jurnal Pendidikan Dan Pembelajaran Ke-SD-An*, 8(2), 351-360. <https://doi.org/10.31316/esjurnal.v8i2.1514>
- Nurhayati, N., Arafat, Y., & Fitriani, Y. (2020). Penggunaan Media Power Point Dalam Pembelajaran Matematika dan Pengaruhnya Terhadap Prestasi Belajar Siswa. *Jurnal Ilmiah Bina Edukasi*, 13(1), 75-87. <https://doi.org/10.33557/jedukasi.v13i1.1036>
- Putra, F. G. 2016. Pengaruh Model Pembelajaran Reflektif dengan Pendekatan Matematika Realistik Bernuansa Keislaman Terhadap Kemampuan

- Komunikasi Matematis. *Al-Jabar: Jurnal Pendidikan Matematika*, 7(2), 203-210. <https://doi.org/10.24042/ajpm.v7i2.35>
- Rusman, Kurniawan, D., dan Riyana, C., (2019). *Pembelajaran Berbasis Teknologi Informasi dan Komunikasi*. Cetakan Kelima. PT RajaGrafindo Persada. Depok.
- 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. <https://doi.org/10.37058/jp3m.v7i1.2623>
- Sjukur, S. B. (2012). Pengaruh Blended Learning Terhadap Motivasi Belajar dan Hasil Belajar Siswa Di Tingkat SMK. *Jurnal Pendidikan Vokasi*, 2(3), 368-378. <https://doi.org/10.21831/jpv.v2i3.1043>
- Suhendri, H., & Werdiningsih, C. E. (2019). Peranan Metode Pembelajaran Collaborative Learning Terhadap Pemecahan Masalah Matematika. *JKPM (Jurnal Kajian Pendidikan Matematika)*, 4(2), 155-162. <https://doi.org/10.30998/jkpm.v4i2.3875>.
- Ulia, N., Saputri, R. D., & Kusumadewi, R. F. (2019). Model Collaborative Learning Berbantuan Media Ekspresomatika Terhadap Literasi Matematika Siswa Sekolah Dasar. *Jurnal Ilmiah Pendidikan Dasar*, 6(1), 45-57. <http://dx.doi.org/10.30659/pendas.6.1.45-57>
- Van Leeuwen, A., & Janssen, J. (2019). A Systematic Review Of Teacher Guidance During Collaborative Learning In Primary And Secondary Education. *Educational Research Review*, 27, 71-89. <https://doi.org/10.1016/j.edurev.2019.02.001>
- Wibowo, L. A., & Pardede, L. R. (2019). Peran Guru Dalam Menggunakan Model Pembelajaran Collaborative Learning Terhadap Keaktifan Siswa dalam Belajar. *Diskusi Panel Nasional Pendidikan Matematika*, 5(1). <https://proceeding.unindra.ac.id/index.php/DPNPMunindra/article/view/577>