

Think Talk Write (TTW) Learning Model by Using Realia Towards Mathematical Communication Ability of Elementary School Students

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Abstract

The purpose of this study was to analyze the effectiveness of Think Talk Write learning with realia media compared to expository learning on students' mathematical communication ability. This study applied a quantitative research design with a quasi-experimental nonequivalent control group design. Sampling was done by using simple random sampling technique; therefore, the sample obtained was SD N 9 Panggang as the experimental class and SD N 2 Bulu as the control class with a total of 78 students. The data collection technique used in this study was the achievement test of learning outcomes by comparing the test scores of the two groups by using the z-test and t-test. The results showed that the Think Talk Write learning with realia media was effective in improving students' mathematical communication ability as indicated by the acquisition of z-test results obtained by $z_{\text{count}} > z_{\text{table}} = 2.868 > 0.174$ which means that students who were taught by using Think Talk Write had achieved classical completeness by 75%. These results were supported by the results of the independent sample t-test which showed that the Sig. (2-tailed) 0.000 smaller than 0.05, which means that the average value of mathematical communication ability of students who follow the Think Talk Write learning with realia media was higher than the expository. Think Talk Write learning with realia media can be used as an easy solution for teachers to improve students' mathematical communication ability.

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INTRODUCTION

One important aspect that influences the success of learning is the form of communication used by teachers and students when they are interacting each other (Tandililing, 2012). The ability to communicate with others is one of the keys to success of someone. Likewise in the learning process, the success of the teaching and learning process can be measured by the success of students participating in learning activities. If students are not able to establish communication with fellow students or with their teachers, the learning process will take place less optimally. The learning process will work well if there is good communication between the teacher and students and students with students. Communication is very important in the learning process, including in mathematics learning because communication is a tool to measure students' understanding about what they have learned.

Martunis, M. Ikhsan, & Syamsul (2014) stated that communication is one of the abilities that need to be possessed and developed in students. Haqiqi, Scolastika, & Masrukan (2017) revealed the importance of communication as a way of sharing ideas and clarifying understanding. Students who are studying mathematics as if they are talking and writing about what they are doing. This shows that communication skills are an important component in the learning process, including in mathematics learning.

Arifin, Kartono, & Sutarto (2014) stated that communication skills are one of the 5 mathematical abilities recommended by NCTM. Mathematical communication skills (mathematical communication) in mathematics learning need to be developed. Through communication, students have the opportunity to develop their understanding of concepts to share or clarify with other students. In addition, students' mathematical communication can organize mathematical thinking both orally and written.

Alhaddad, Yaya, Jozua, & Jamawi (2015), stated that students who have good mathematical

communication skills will be able to solve problems correctly through mathematical models, tables, graphs, and others. Through mathematical communication skills, students will find it easier to find alternative problem solving that can improve students' ability to solve mathematical problems. Thus, mathematical communication skills are important to be explored and developed by teachers in mathematics learning so students can have the ability to provide information in a concise, concise, and clear and accurate manner.

Ministry of National Education (Depdiknas, 2003) explains that mathematical communication is the ability of students to express and interpret mathematical ideas verbally, in writing, or to demonstrate what is in mathematical problems. Furthermore, Qohar (2011) explained that communication is needed to understand mathematical ideas correctly. Weak communication skills will have an impact on the lack of other mathematical abilities.

Based on the results of observations and interviews with one of the fourth grade teachers that the researcher conducted on the mathematics learning process at SD N 9 Panggang Jepara, there were still many students who had difficulty expressing mathematical ideas, understanding, and using mathematical terms. As a result, students feel difficulties in solving story problems that require students to communicate their ideas.

The role of the teacher as the delivery of knowledge in learning becomes the main key in an effective learning in school. Learning mathematics is very much determined by the strategy used by the teacher in teaching mathematics itself. The learning that is considered able to overcome this problem is the Think Talk Write (TTW) learning strategy by using realia. In Think Talk Write learning, realia media plays a role to help students to be easier in learning and understanding mathematics learning materials. Mathematics is abstract, for elementary students thinking abstractly may be difficult. Therefore, a tool is needed that can help students imagine things that are abstract through concrete objects.

The TTW strategy is basically built through thinking, speaking, and writing. The TTW strategy flow starts from the involvement of students in thinking (dialogue with them) after the reading process, then speaking and sharing (sharing) with his friends before writing, namely writing the results of the discussion or dialogue on the worksheet provided. Writing activity means constructing ideas, because after discussing or dialogue between friends, then expressing it through writing. Writing in mathematics helps to realize one of the goals of learning, namely students' understanding of the material he learned. Thus, TTW learning can be used to improve student communication skills.

The TTW strategy introduced by Huinker and Laughlin (1996) is basically built through thinking, speaking and writing. This strategy begins with students reading material that has been packed with a constructivist approach to understand their content (think), then students communicate to get a common understanding (talk), and finally discussion and negotiation, students write their thoughts in the form of summary. The TTW strategy can help students develop writing skills and mathematical understanding. The phases in the cooperative model syntax used in learning guide students to express their mathematical ideas and learning to write through activities summarizes at the end of learning. The TTW strategy applied to learning can direct students to find mathematical concepts (Winayawati, Waluya & I. Junaedi, 2012).

Khotimah (2017) explained that contextual learning with the strategy of Think Talk Write (TTW) is effectively used in teaching cube and beam material. Pratiwi, Bambang, & Suhartono (2016) also explained that the role of media in learning by using Think Talk Write model can improve students' writing skills. Another opinion was expressed by Suyanto (2016) who explained the effectiveness of the Think Talk Write-based learning journal strategy in improving mathematical writing skills.

In this study, TTW learning is combined with realia media to improve students' mathematical communication ability. Realia media is a medium of real objects that can

improve student learning motivation (Irawan, 2017). Wahyuni (2014) explained that the use of realia media can improve students' science skills. Furthermore Suriansyah & Siti (2016) also explained that the use of realia learning media in the form of modeling space can increase students' understanding of the concept of the nature of geometry.

Based on several studies that have been proposed, a research gap is found in the form of limitations on previous research. There were no studies found specifically applying Think Talk Write learning by using media realia. Therefore, researcher want to implement Think Talk Write learning by using realia to find out whether the results remain consistent in improving mathematical communication or it will even result in decreased results or inconsistencies with the previous studies.

METHODS

The population in this study was all elementary schools that have used the 2013 curriculum in Jepara in the academic year of 2017/2018. Then, the determination of the sample in this study was done by using simple random sampling technique, therefore, obtained the research sample of SD N 9 Panggang as the experimental class, which was the class that taught by using Think Talk Write learning with realia media and SD N 2 Bulu as the control class that taught by using expository learning.

The design of this study was a quasi-experimental form with nonequivalent control group design. The data analyzed in this study was the mathematical communication ability data obtained from the posttest scores. This data was in the form of quantitative data. The data collection technique used in this study was the test that given in the form of essay with 8 questions.

The research variables used were two, independent variables and dependent variables. The independent variable in this study was the learning of Think Talk Write with realia media and expository models. The dependent variable was students' mathematical communication

ability. The instrument used in this study was a mathematical communication ability test in the form of posttest of essay question. The material tested was circumference and flat area. The test given to each class is posttest with the same problem. Before data collection was carried out, the validity of the tests were tested for students outside the sample to determine the validity, reliability, and sensitivity of the test. The test results of the test instrument provide information that the validity, reliability and sensitivity of the test have met the criteria. Thus, the test instruments that are prepared are suitable to be used to collect data on mathematical communication skills. Mathematical communication ability in this study is the ability of students to express mathematical ideas in writing, namely the ability to write down what is known and asked according to problems; write down the answer in accordance to the questions; draw a picture which is relevant to the questions; and make a written conclusions by using their own language.

The data of mathematical communication ability after participating in learning were analyzed by using statistical tests to determine the effectiveness of Think Talk Write learning with realia media on students' mathematical communication ability. Before conducting a statistical test, it is necessary to conduct a prerequisite test, namely the test for normality and homogeneity of the data. After testing for normality, the results were obtained that the two samples came from a population with normal distribution. The homogeneity test results explain that the two samples have the same variation.

The final test score was tested for classical completeness by using proportion test and tested for the average difference in learning outcomes with t-test. In this average difference test used t-test formula (Sudjana, 2005). The value of t is then compared with t_{table} , namely $t_{(1-\alpha)(n1-2)}$ with $\alpha = 5\%$. If $t_{count} > t_{table}$, the experimental class learning outcomes are better than the control class learning outcomes. If the value of $t_{count} < t_{table}$ then the opposite applies, (Sudjana, 2005). The average difference test is done to determine a better method based on the average results of the

mathematical communication skills obtained by students.

RESULTS AND DISCUSSION

The hypothesis in this study was tested by using the z-test and t-test. The results of the students' mathematical communication ability tests are presented in Table 1.

Table 1. The Result of Students' Mathematical Communication Ability Test

Class	Completeness	
Obtained Scores	Z_{value} 2.686	Z_{table} 0.174
Explanation	Complete	

Based on the results of the classical completeness test (Table 1) obtained the value of $Z_{count} > Z_{table}$ which means that students who are subjected to the Think Talk Write learning with realia media achieved the classical completeness by 75%. Then, it was strengthened by the results of the average difference test of the learning of Think Talk Write with realia media on students' mathematical communication ability which can be seen in the following Table 2.

Tabel 2. The Result of Comparison Test on Mathematical Communication Ability

		t-test for Equality of Means		
		t	df	Sig. (2-tailed)
Mathematical communication ability	Equal variances assumed	-4.045	76	.000
	Equal variances not assumed	-4.000	69.799	.000

Based on Table 2, the results of the above calculation, obtained $t_{count} = -4.045 < -1.991$. So that H_0 is rejected, H_1 is accepted. Based on the significance values in the sig. column (2-tailed) $0,000 > sig. value 0.05 (5\%)$ which means that H_0 is rejected and H_1 is accepted. Based on the scores obtained, it can be interpreted that there are significant differences in students' mathematical communication ability between the control group and the experimental group. The differences in students' mathematical communication ability between the control group and the experimental group proved that H_0 is rejected and H_1 is

accepted where the average value of students' mathematical communication ability in Think Talk Write learning was higher than the average value of students' mathematical communication ability in the expository learning. Overall, the mathematical communication ability of control class students tends to be less developed. The detail of the results can be seen in the following Table 3.

Table 3. The Scores of Students Mathematical Communication Ability on each Aspect

No	The Aspect Observed	Average (%)	
		C	E
1.	The ability to write on what is known and asked in accordance to the problem	64	88
2.	Write the answer in accordance to the question	58	91
3.	Draw a picture in accordance to the question	67	93
4.	Make a written conclusion with the students' own language	56	86

C = Control, E = Eksperiment

Based on the scores obtained, it can be concluded that there are significant differences in students' mathematical communication ability between the control group and the experimental group. The differences in students' mathematical communication ability between the control group and the experimental group proved that H_0 is rejected and H_1 is accepted where the average value of students' mathematical communication ability who participated in the Think Talk Write learning was higher than the expository learning. Since there are differences, then it can be assumed that Think Talk Write learning with realia media is more effective than the expository learning on students' mathematical communication ability.

It has been stated in the classical completeness test, showing significantly the success of the learning process by using TTW learning. This success is due to learning with the TTW strategy succeeding in increasing the abilities and skills of students towards the positive side. Amelina, Yerizon, & Jazwinarti (2018) found that TTW learning can improve students' understanding of mathematical concepts. In line with the research, Rizal (2018) explained that TTW learning had a positive effect on students' activeness in mathematics learning. The TTW

strategy gives wider opportunities for students to discuss groups constructing their knowledge with heterogeneous members, allowing each student to have different creativity in solving problems, so that each student can exchange opinions and each student actively strives to find and express opinions (Afiati, 2012).

Susanto & Haninda (2018) found that the learning model of Think Talk Write effective in mathematics learning. Radiati, Yarman, & Jazwinarti (2018) explained that the TTW model can help students better understand the material, work together, share knowledge with other friends and write solutions to individual problems. The TTW model can also invite students to enjoy mathematics by showing them how to learn mathematics and explore their thoughts and express their thoughts. Students indirectly carry out positive activities on themselves.

In contrast to the research conducted by Yanti, Sugeng, & Haninda (2017) who explained that TTW type cooperative learning is not effective against students' mathematical communication skills. For this reason, in this study Think Talk Write (TTW) learning was developed by adding media realia to be able to improve students' mathematical communication skills.

The results of the above study can be strengthened by Figure 1 which is the work of the control class students and Figure 2 which is the results of the work of the experimental class students.

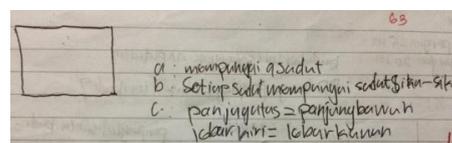


Figure 1. Part of Students Work Prior to Treatment

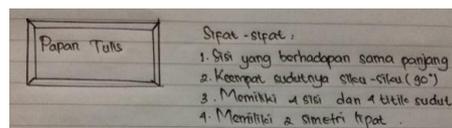


Figure 2. Part of Students Work After Treatment

As can be seen in Figure 1, the drawing of a rectangular plane geometry of students was

looking careless. Students only think that the most important thing is the picture made consists of four sides. From these pictures, students cannot correctly state the properties of a rectangle. In Figure 2, it looks neater and the students' drawings also correspond to the properties possessed by a rectangle, then, if the student was asked to mention the characteristics of a rectangle, the student can mention it correctly. These results indicate that realia media has a role in increasing students' understanding of geometry so that it has an impact on improving students' mathematical communication ability.

Realia media are real objects that are used as material or learning resources (Sugiharti, 2017). Realia media is used as a tool that can help students improve students' understanding of plane geometry material, which in turn can improve students' mathematical communication ability. Some functions of realia media in learning, such as: directing students to concentrate on the content of the lessons displayed, encouraging students to be more active in learning, accommodating students who are weak in accepting and understanding the lessons presented in text or verbally, and moving students to do an activity.

Sugiharti (2017) revealed that the use of realia (real) media in mathematics learning can improve student learning outcomes and understand material better, so that the completeness in student learning also increases. Besides, teaching and learning activities by using realia media (real) can increase student learning activeness in participating in teaching and learning activities. This is based on the use of realia media that can provide direct experience to students. Students can use as many sensory devices as they can with the use of realia media. Students can also play an active role in learning by using realia media, such as seeing, feeling, making various observations, and reporting results. The ability of the media to improve student understanding is supported by the results of Musakkir's study (2015) which found that the use of instructional media provides better learning outcomes for students.

The direct experience obtained by students in using realia media can clarify plane geometry material in the learning process so that students can truly understand the matter of plane geometry and not just memorizing. This is in line with the opinion of Darmiyati & Riwi (2017) that the use of concrete media objects can help students to understand the concept of the material being taught easily, facilitate students in the calculation process, provide direct experience; learning becomes memorable, and can concretize the abstract learning.

The use of media realia in learning makes students active and helps students build their own knowledge by directly experiencing the experience (Nasution & Dwi, 2017). This is in accordance with the opinion of Lestari & Eka (2014) which states that the use of realia media is more effective in increasing the learning activeness.

Realia media has benefits for children and teachers. Byrd stated that realia media helps provide direct experience to children. Realia media is ideal for introducing children to new subjects and helping children clarify the true meaning of abstract words (Apriyansyah, 2018). Thus, realia media can make it easier for children to understand learning since children are faced directly with the real thing. These things underlie the increase in students' mathematical communication ability.

CONCLUSION

The use of Think Talk Write with realia during the effective learning process in improving students' mathematical communication skills as indicated by the acquisition of z-test results obtained by $z_{\text{count}} > z_{\text{table}} = 2.686 > 0.174$ which means that students who are subjected to using Think Talk Write learning with realia achieved classical completeness of 75%. These results were strengthened by the results of the independent sample t-test which shows that the value of Sig. (2-tailed) 0.000 less than 0.05, which means that there is a significant difference in students' mathematical communication skills between the control group and the experimental group, where

the average scores of students' mathematical communication ability that followed Think Talk Write learning with realia was higher than the average scores of the students' mathematical communication ability who followed the expository learning. The use of realia media in learning also has a positive impact that can improve students' mathematical communication skills. These results give the meaning that Think Talk Write learning with realia is effectively applied in learning to improve the mathematical communication ability of fourth grade students of SD N 9 Panggang Jeparu.

REFERENCES

- Afiati, R., Masrukan & Waluyo, S. B. (2012). Pengembangan Perangkat Pembelajaran Matematika dengan Strategi *Think Talk Write* (TTW) Berbasis Konstruktivisme Materi Bangun Ruang Sisi Datar Kelas VII. *Unnes Journal of Research Mathematics Education*, 1(1), 1-6. Retrieved from <https://journal.unnes.ac.id/sju/index.php/ujmer/article/view/18>
- Alhaddad, I., Kusumah, Y. S., Sabandar, J., & Dahlan, J. A. (2015). Enhancing Students' Communication Skills Through Treffinger Teaching Model. *Journal on Mathematics Education*, 6(1), 31-39. Retrieved from <https://ejournal.unsri.ac.id/index.php/jme/article/view/1856>
- Amelina, T.W., Yerizon, & Jazwinarti. 2018. Penggunaan Model Pembelajaran Kooperatif Tipe *Think Talk Write* (TTW) Untuk Meningkatkan Pemahaman Konsep Matematika. *Jurnal Pendidikan Matematika*, 7(2), 58-64. Retrieved from <http://ejournal.unp.ac.id/students/index.php/pmat/article/view/3721/2417>
- Apriyansyah, C. 2018. Peningkatan Kecerdasan Naturalis Melalui Penggunaan Media *Realia*. *Jurnal AUDI*, 3(1), 13-26. Retrieved from <https://ejournal.unisri.ac.id/index.php/jpaud/article/view/2069>
- Arifin, A. T., Kartono & Sutarto, H. (2014). Keefektifan Strategi Pembelajaran React pada Kemampuan Siswa Kelas VII Aspek Komunikasi Matematis. *Kreano, Jurnal Matematika Kreatif Inovatif*, 5(1), 91-98. Retrieved from <https://journal.unnes.ac.id/nju/index.php/kreano/article/view/3282>
- Darmiyati & Riwi, N.H. 2017. Penerapan Model *Explicit Instruction* Dikombinasikan dengan Model *Probing Prompting* dan Media Realita Pada Pembelajaran Matematika di Sekolah Dasar. *Jurnal Vidya Karya*, 32(2), 139-147. Retrieved from <https://ppjp.ulm.ac.id/journal/index.php/JVK/article/view/5231>
- Depdiknas. (2003). *Kurikulum 2004 Standar Kompetensi Sekolah Dasar*. Jakarta: Depdiknas.
- Haqiqi, M. I., Mariani, S., & Masrukan, M. (2017). Karakter Tanggung Jawab dan Keterampilan Komunikasi Matematis pada Pembelajaran Berpendekatan PMRI Berbantuan *Scaffolding* Materi Pecahan. *Journal of Primary Education*, 6(1), 21-26. Retrieved from <https://journal.unnes.ac.id/sju/index.php/jpe/article/view/14509>
- Irawan, D. (2017). Teaching Vocabulary by Using Realia (Real-Object) Media. *English Community Journal*, 1(1), 41-45. Retrieved from <http://jurnal.um-palembang.ac.id/englishcommunity/article/view/650>
- Khotimah, K. (2017). Pengembangan Perangkat Pembelajaran Kontekstual dengan Strategi *Think Talk Write* (TTW) pada Materi Kubus dan Balok. *Jurnal Dinamika Penelitian: Media Komunikasi Penelitian Sosial Keagamaan*, 17(2), 257-270. Retrieved from <http://ejournal.iain-tulungagung.ac.id/index.php/dinamika/article/view/839>
- Lestari, N. & Eka, M. 2014. Pengaruh Penggunaan Benda Realia Terhadap Keaktifan Belajar Siswa Pada Mata Pelajaran Ilmu Pengetahuan Alam Di Sekolah Dasar Negeri Setia Darma 03 Tambun Selatan. *Pedagogik*, 2(2), 1-8. Retrieved from <http://jurnal.unismabekasi.ac.id/index.php/pedagogik/article/view/1240>
- Martunis, Ikhsan, M. & Syamsul, R. (2014). Meningkatkan Kemampuan Pemahaman dan Komunikasi Matematis Siswa Sekolah Menengah Atas melalui Model Pembelajaran Generatif. *Jurnal Didaktik Matematika*, 1(2), 75-84. Retrieved from <http://www.jurnal.unsyiah.ac.id/DM/article/view/2079>
- Musakkir, M. (2015). Pengaruh Media Pembelajaran dan Motivasi Belajar terhadap Hasil Belajar Matematika Siswa Kelas IV Sekolah Dasar

- Kabupaten Tanah Tidung. *Jurnal Pendidikan Dasar*, 6(1), 36-47. Retrieved from <http://pps.unj.ac.id/journal/jpd/article/view/313>
- Nasution, A. S. & Dwi, S. A. W. (2017). Peningkatan Kemampuan Berhitung Anak melalui Benda Realia. *Jurnal Penelitian Pendidikan MIPA*, 2(1), 123-129. Retrieved from <https://studylibid.com/doc/1175044/peningkatan-kemampuan-berhitung-anak-melalui-benda-realia>
- Pratiwi, D. P., Bambang, Y. & Suhartono. (2016). Pengembangan Media *Flashcard* Berbasis *Macromedia Flash* pada Pembelajaran Bahasa Indonesia Model *Think Talk Write* untuk Meningkatkan Kemampuan Menulis Siswa Kelas IV Sekolah Dasar. *Jurnal Review Pendidikan Dasar : Jurnal Kajian Pendidikan dan Hasil Penelitian*, 2(1), 105-111. Retrieved from <https://journal.unesa.ac.id/index.php/PD/article/view/1182>
- Qohar, A. (2011). Mathematical Communication: What and How to Develop it in Mathematics Learning?. *Proceeding*. Department of Mathematics Education. Yogyakarta: Universitas Negeri Yogyakarta. Retrieved from <https://core.ac.uk/download/pdf/11058861.pdf>
- Radiati, E., Yarman, & Jazwinarti. (2018). Model Pembelajaran Kooperatif Tipe Think Talk Write untuk Meningkatkan Pemahaman Konsep Matematika. *Jurnal Pendidikan Matematika*, 7(1), 48-53. Retrieved from <http://ejournal.unp.ac.id/students/index.php/pmat/article/view/3255>
- Rizal, M. S. (2018). Pengaruh Model Pembelajaran Kooperatif Tipe *Think Talk Write* (TTW) Terhadap Keaktifan Belajar Siswa dalam Pembelajaran Matematika Kelas IV SDM 020 Kuok. *Cendekia: Jurnal Pendidikan Matematika*, 2(1), 105-117. Retrieved from <https://j-cup.org/index.php/cendekia/article/view/37>
- Sudjana. (2005). *Metode Statistika*. Bandung: Tarsito.
- Sugiharti. (2018). Penggunaan Media Realia (Nyata) untuk Meningkatkan Aktifitas dan Hasil Belajar Matematika Kompetensi Mengenal Lambang Bilangan Pada Siswa Kelas I SDN 02 Kartoharjo Kota Madiun. *Jurnal Edukasi Gemilang*, 3(1), 7-14. Retrieved from <https://ejurnalkotamadiun.org/index.php/JEG/article/view/89>
- Suriansyah, A. & Siti, M. (2016). Meningkatkan Hasil Belajar Konsep Sifat-sifat Bangun Ruang dengan Model Pembelajaran *Two Stay Two Stray* dan Media Realia Siswa Kelas V SDN Pengambangan 8 Kota Banjarmasin. *Jurnal Paradigma*, 11(2), 5-10. Retrieved from <https://ppjp.ulm.ac.id/journal/index.php/paradigma/article/view/2689>
- Suyanto, E. (2016). Pembelajaran Matematika dengan Strategi TTW Berbasis *Learning Journal* untuk Meningkatkan Kemampuan Menulis Matematis. *Kreano, Jurnal Matematika Kreatif Inovatif*, 7(1), 58-65. Retrieved from <https://journal.unnes.ac.id/nju/index.php/kreano/article/view/5001>
- Tandililing, E. (2012). Pengembangan Instrumen untuk Mengukur Kemampuan Komunikasi Matematik, Pemahaman Matematik, dan *Self Regulated Learning* Siswa dalam Pembelajaran Matematika di Sekolah Menengah Atas. *Jurnal Penelitian Pendidikan*, 13(1), 24-31. Retrieved from <http://jurnal.upi.edu/penelitian-pendidikan/view/1388/pengembangan-instrumen-untuk-mengukur-kemampuan-komunikasi-matematik-pemahaman-matematik--dan-self-regulated-learning-siswa-dalam-pembelajaran-matematika-di-sekolah-menengah-atas.html>
- Wahyuni, S. (2014). Upaya Peningkatan Keterampilan Sains dengan Pemanfaatan Potensi Daerah Pulau Buhias sebagai Media Realia dalam Pembelajaran IPA di Daerah Terdepan, Terluar, dan Tertinggal (3T) Kabupaten Sitiro – Sulawesi Utara. *Jurnal Pendidikan Biologi*, 6(1), 50-57. Retrieved from <http://journal.um.ac.id/index.php/jpb/article/view/7825>
- Winayawati, L., Waluya, S. B., & Junaedi, I. (2012). Implementasi Model Pembelajaran Kooperatif dengan Strategi *Think-Talk-Write* terhadap Kemampuan Menulis Rangkuman dan Pemahaman Matematis Materi Integral. *Unnes Journal of Research Mathematics Education*, 1(1), 65-71. Retrieved from <https://journal.unnes.ac.id/sju/index.php/ujmer/article/view/36>
- Yanti, A., Sugeng, S., & Haninda, B. (2018). Efektivitas Pembelajaran Kooperatif Tipe Think Talk Write Ditinjau dari Kemampuan Komunikasi Matematis. *Jurnal Pendidikan Matematika Unila*, 5(8). Retrieved from <http://jurnal.fkip.unila.ac.id/index.php/MTK/article/view/13851>