International Journal of Trends in Mathematics Education Research
Vol. 5, No. 3 (2022), pp. 236-243
ISSN 2621-8488 (online)
DOI: https://doi.org/10.33122/ijtmer.v5i3.122

SAINTIS publishing

Research Article

The effect of learning *Think Talk Write* model with Powerpoint assistance on students' mathematics learning outcomes

Abdul Muis✉ & Endra Priawasana

University of PGRI Argopuro Jember, Jawa Timur, Indonesia, 68121
✉Corresponding Author: muismuhammad416@gmail.com | Phone Number +6285270654325

Received: 27 August 2022 *Revised: 13 September 2022* *Accepted: 20 September 2022* *Available online: 30 September 2022*

ABSTRACT

This study aims to know the effect of the Power-point-assisted Think Talk Write (TTW) learning model on student learning outcomes. The type of study is experimental and the design is one group pretest-posttest design. This type begins with measuring the initial ability of students than giving treatment and then giving a remeasurement or posttest. This analysis was conducted to determine the effect of the Powerpoint-assisted TTW learning model on students learning outcomes. The results of the study showed that the significance value between the pretest and posttest was 0.002 and the sign value was < 0.05. Based on the decision that the sign value is 0.002 and less than 0.05 which means that there is a significant difference between the pretest and posttest there is a significant effect on the treatment given. This means that there is a significant influence on the Powerpoint-assisted TTW learning model on student learning outcomes.

Keywords: Think Talk Write model; Powerpoint; Students' Learning Outcomes; Mathematics Learning; Learning Models

1. INTRODUCTION

Education, both formal and informal, is an active platform that can be used to develop science and technology (IPTEK) as well as quality human resources (Opticia et al., 2022; Qurohman et al., 2022; Risalah & Hodiyanto, 2022; Umilasari et al., 2022). The influence of education on a person is very large, so everyone needs education in his life (Anggraini et al., 2022; Hariastuti et al., 2019; Wigati et al., 2022). Improving the quality of education, including teaching mathematics, is a goal that needs to be pursued, because education is the spearhead in improving the quality of human resources (Bahri et al., 2022; Hermanto, Didik., Budayasa, Ketut., Lukito, 2020; Putri et al., 2022). Quality education can equip students with the ability to follow life's directions to solve life's problems. More broadly, a quality education can prepare students to become future masters of science and technology.

The quality of life of a country is largely determined by educational factors, therefore it is necessary to reform education to improve the quality of education, realizing that education must adapt to changes in society (Hedi et al., 2022; Sabilah & Yolanda, 2022). In the context of educational innovation, three main factors must be considered, namely program changes, improving the quality of learning, and the effectiveness of learning methods (Fajriana et al., 2022; Mas' ud & Wahid, 2022). Our world of education does not provide opportunities for students in different subjects to develop the ability to think holistically (globally), creatively, objectively and logically. The learning approach is still dominated by the teacher's role. Teachers see students as objects rather than students, and pay less attention to the holistic nature of individual learning (Kurniawan et al., 2022; Matorevhu, 2019).

A good teaching and learning process will certainly achieve the learning objectives that have been set, followed by the ability of students to absorb the content of the lesson (Hajeniati & Kaharuddin, 2022; Lumbantoruan & Nadeak, 2022). This activity is certainly related to the pedagogical strategy used. The teacher must carry out an activity called "planning" before continuing with the implementation of the learning content delivered. The goal is that every teacher is ready in teaching and learning activities to teach the target topic. With learning strategies planned and created, it is likely that the topics presented will be accepted by all students. Efforts to produce learning quality approach could be done through the development of learning (Herrmann, Bager-Elsborg, & McCune, 2017; Barak and Assal,2018), learning strategy (Sun, et al., 2018) or the application of learning models (Baº & Beyhab, 2017).

The teacher's task is to create a learning atmosphere that can provide enthusiasm for students to study well and enthusiastically (Lumbantoruan & Nadeak, 2022; Saputra et al., 2022; Tonra et al., 2019). With a comfortable teaching and learning climate for students to be able to compete in a healthy manner and motivate students to learn, it will bring a

positive atmosphere in achieving learning outcomes. On the other hand, without it, whatever the teacher does will not get an active student response. By planning and choosing the right strategy that is adapted to the conditions in the classroom, it will help the teacher to achieve the learning objectives. As we know that the learning method is an interactive means of teachers and students in teaching and learning activities. Thus, what needs to be considered is the accuracy of the chosen learning method with the purpose, type and nature of the subject matter as well as the teacher's ability to understand and implement the method (Aida, 2020; Alim et al., 2020; Pratiwi et al., 2019; Rofieq et al., 2021).

Based on observations and interviews at SMA N 3 Bondowoso in class for four meetings regarding learning in class, several facts were obtained. Observations relate to the learning carried out by the teacher and from student activities during class learning. The results of observations seen from the way the teacher teaches show that mathematics learning is a system of linear equations that tends to be teacher-centered. Starting from an explanation related to the theory, definition, followed by learning examples of questions. At the end, the students were asked to do the practice questions independently to find out the students' ability to work on the questions after being given the subject matter. Students seem to find it difficult to solve the questions given by the teacher. Teachers also pay more attention to students sitting in the front row than others. Students tend to listen without doing activities that can develop their abilities. Students look passive because they only do the work given by the teacher and tend to always listen to the teacher's explanation. The problems that occur need a solution so that learning becomes better. Constructivistic learning is one solution that puts forward activities that build on what is learned.

Constructivist activities can be easily carried out if there is good interaction between teachers and students (Djamahar, Ristanto, Sartono, Ichsan, & Muhlisin, 2018; Rukmini & Saputri, 2017; Ristanto, Zubaidah, Amin, & Rohman, 2018). According to Suparmi (2012), Purnawan (2014), Darmawan, et al., (2018), Cooperative learning is basically a constructivist understanding, with several small groups having members with different abilities.. A learning model that is able to actively involve students and can make it easier for students to understand the subject matter delivered is one of them using the TTW learning model.

Wirda (2017), TTW learning is developed and built through the activities of thinking, talking and writing involves a problem solving in small groups. Wiadnyana (2013), based on his research there is a students' interest in enhancing learning through Think Talk Write method implementation. Treatment that can be done to activate students and have a positive impact in the classroom and its environment is one of them by learning with a cooperative model. Cooperative learning in the classroom emphasizes that the class goes together towards a goal, fostering positive relationships, meaning that in this cooperative teaching process students are required to learn actively so that they are able to solve problems together. According to Riski (2017) this learning model makes students more active and play a more dominant role than teachers. Furthermore, Hartanto (2017) the Think Talk Write learning model uses small groups and requires students to work together, discuss, share knowledge, communicate with each other, and help each other to understand the subject matter. In the impact of learning Artut (2010), Pandya (2011) and Tarim (2009), show that cooperative learning has a positive influence on learning achievement.

2. RESEARCH METHOD

The study design used in this research is "One Group Pretest Postest Design". Fitrianingsih & Musdalifah (2015) used the One Group Pretest-Post test Design because there was a pretest before being given treatment, the results of the treatment can be known more accurately because they can be compared want with the conditions before being given treatment. According to Arikunto (2006:101) population is the entire research subject. The population in this research are students of class X class A and B of SMAN 3 Bondowoso, totaling 58 students. Sampling using purposive sampling technique, namely the technique of determining the sample in certain considerations. (Sugiyono, 2006:61). The sample used in Class A is 25 students with low student abilities and passive in learning. The analysis technique used is the t test (paired simple t test). Paired simple t-test is a test to compare the difference between two means of the same sample with the assumption of a normal distribution. During the calculation of data analysis, the researcher used SPSS IBM Statistics 25.

3. RESULTS AND DISCUSSION

3.1 Results

The results of this study indicate that the application of the Think Talk Write type cooperative learning model with the help of Media Power Point has a positive influence on students' mathematics learning outcomes at SMA N 3 Bondowoso. From the data obtained from 25 students showed that 23 students experienced an increase. The average increase in students' mathematics learning outcomes seen through the calculation of students' mathematics tests given before and after treatment was 13.76. This increase is quite significant. This research was carried out through several stages in accordance with the research method described on the previous page. The data collection process was carried out after the researchers gave treatment to the students. The treatment is in the form of implementing a Think Talk Write type cooperative learning model with the help of Power Point Media. The following data obtained can be seen in **Table 1**.

Table 1. List of Student Scores pretest-posttest

No	Names	Pretest	Posttest
1	ZA	78	88
2	ZB	60	84

3	ZC	74	78
4	ZD	71	70
5	ZE	71	82
6	ZF	55	79
7	ZG	68	73
8	ZH	64	68
9	ZI	59	71
10	ZJ	56	87
11	ZK	58	90
12	ZL	57	81
13	ZM	51	71
14	ZN	64	76
15	ZO	63	77
16	ZP	74	82
17	ZQ	74	87
18	ZR	62	72
19	ZS	60	69
20	ZT	66	70
21	ZU	62	76
22	ZV	60	85
23	ZW	60	70
24	ZX	71	71
25	ZY	55	80

At the time of the research, all students attended Think Talk Write learning assisted by Power Point Media. So that researchers get the overall data of students, namely 25 students. All students always participate in learning activities during the research. The following are the results of statistical calculations using the t-test using the "Paired Sample t-Test" using IBM statistics 25. Before calculating the Paired Sample t-Test, the data requirements were tested, namely the normality test and homogeneity test. The following are the results of the normality test.

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		25
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	7.14757642
Most Extreme Differences	Absolute	.109
	Positive	.097
	Negative	-.109
Test Statistic		.109
Asymp. Sig. (2-tailed)		.200[c,d]

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

d. This is a lower bound of the true significance.

Based on the normality test above, obtained a significance value of 0.200 which is more than 0.05 which means that the data is normally distributed.

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Pretest Postest	Based on Mean	.004	1	48	.948
	Based on Median	.001	1	48	.972
	Based on Median and with adjusted df	.001	1	44.817	.972
	Based on trimmed mean	.004	1	48	.951

Known sign value of 0.951 which is based on the decision that if the sign value More than 0.05 then the data is homogeneous. Because the significance value is 0.951 and more than 0.05, the data is homogeneous. Based on the two test conditions that have been met, the researcher continues to test the hypothesis using the paired simple t-test. The following are the results of the paired simple t test in this study.

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	63.72	25	7.185	1.437
	Postest	77.48	25	6.832	1.366

Based on the table on the SPSS 25 test, it shows that in the paired sample statistics it is known that the average in the pretest is 63.72 and the posttest is 77.48. this shows that there is a change in the average ability of learning outcomes at SMK N 3 Bondowoso in linear equation system subjects after being given treatment in the form of a Powerpoint-assisted Think Talk Write learning model. Changes from pretest to posttest experienced an average increase of 13.76.

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Pretest & Postest	25	.102	.627

Based on the results with the use of IBM SPSS 25, it shows that the number of samples is 25 which is based on the known sign value of 0.627. The significance value is more than 0.05 which is based on the decision that if the sign value is more than 0.05 then there is no relationship between the pretest and posttest and vice versa if the sign value is less than 0.05 then there is a relationship between the pretest and posttest. Because the table shows a sign value of 0.627 which is more than 0.05, the conclusion is that there is no relationship between pretest and posttest.

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Pretest-Postest	-13.760	9.395	1.879	-17.638	-9.882	-7.323	24	.000

In the paired sample test and in accordance with the decision that if the sign value is less than 0.05, then there is a significant difference between the initial variable and the final variable and shows that there is a significant effect on the difference in the treatment given to each variable. On the other hand, if the sign value is more than 0.05, then there is no significant effect on the difference in the treatment given to each variable. Based on the table after the test, it was found that the sign value was 0.000, where the sign value was less than 0.05, which means that there is a significant effect on the difference in the treatment given to each variable. In conclusion, there is an effect of powerpoint-assisted Think Talk Write model learning on students' mathematics learning outcomes at SMK N 3 Bondowoso.

3.2 Discussion

In this study, the researcher chose to use the Think Talk Write (TTW) learning model using powerpoint media because this learning model could increase student activity in the learning process. By using this learning model, students can think (Think), speak (Talk) and write (Write). The Think Talk Write (TTW) learning model begins by asking students to think or speak for themselves after reading, then talk and share ideas with friends before writing. This atmosphere will be more effective if done in heterogeneous groups consisting of 5 students. In this group, students are encouraged to read, take short notes, explain, listen, and share opinions with friends, then express them in writing. In this think talk write learning activity, students carry out active activities, where students fully think and discuss related problems given. share ideas, ask questions, and give their opinion on solving problems and end by writing solutions.

This activity has a positive impact on students. Through student activities in TTW activities, students have the opportunity to develop their skills appropriately, especially when conveying idea (Suminar & Putri, 2015; Aziz & Maaliah, 2017; Rahmah, 2017). Students are very enthusiastic in learning activities, discussing and expressing opinions. On this occasion the teacher goes around to monitor the course of learning activities and provide direction and stimulus for students or groups who have difficulty solving problems. These thinking, speaking, and writing activities are forms of teaching and learning activities that provide opportunities for students to participate actively. This finding was similar to the research result of Rahmah (2007), Zulkarnaini (2011), Maulidah, Musyarofah and Aulia (2013), and Wiyaka (2013) that showed that the students could write and develop their ideas more asily by implementing the Think-Talk-Write (TTW) learning strategy. Therefore, it can be described that TTW learning provides opportunities for students to develop their abilities in terms of thinking in finding existing problems, writing what is known in the problem, speaking in the form of conveying ideas, discussing well in solving a problem.

4. CONCLUSION

Based on the results of research at SMK N 3 Bondowoso that has been carried out in order to see the effect of the Powerpoint-assisted Think Talk Write learning model on students' mathematics learning outcomes, it can be concluded that through the prerequisite test using the normality test and homogeneity test, it shows that the sign value is 0.200 in the test. normality and a value of 0.951 on the homogeneity test. Based on the significance value is more than 0.05 which means the data is normally distributed and homogeneous. In the paired sample test, after the test, it was found that the sign value was 0.000, where the sign value was less than 0.05, which means that there is an effect of Powerpoint-assisted Think Talk Write model learning on students' mathematics learning outcomes at SMK N 3 Bondowoso.

ACKNOWLEDGEMENTS

The authors would like to thank all those who have helped in the completion of this paper to publish in journal.

AUTHOR'S CONTRIBUTIONS

The authors discussed the results and contributed to from the start to final manuscript.

CONFLICT OF INTEREST

There are no conflicts of interest declared by the authors.

REFERENCES

Aida, Z. (2020). The Effect of Inquiry Model on Teacher's Self Controlling in Class X Virus in SMA Private Vocational School UISU Medan. *International Journal for Educational and Vocational Studies*, *2*(9). https://doi.org/10.29103/ijevs.v2i9.3300

Alim, A. N. A. H., Rahmayanti, H., Husen, A., Ichsan, I. Z., Marhento, G., Alamsyah, M., Susilo, S., Babu, R. U. M., & Rahman, M. M. (2020). Environmental Disaster Education at University: An Overview in New Normal of COVID-19. *International Journal for Educational and Vocational Studies*, *2*(8). https://doi.org/10.29103/ijevs.v2i8.2655

Anggraini, R. S., Ferinaldi, F., Nurfauziah, N., Widada, W., & Herawaty, D. (2022). Study of Mathematical Activities in "Rumah Tuo." *International Journal of Trends in Mathematics Education Research*, *5*(1), 94–104. https://doi.org/10.33122/ijtmer.v5i1.118

Arikunto, S. (2006). *Research Procedure A Practice Approach Revised Edition*. Jakarta: Renika Cipta.

Artut, P. D. (2010). Experimental evaluation of the effects of cooperative learning on kindergarten children's mathematics ability. *International Journal of Education Research.* (48). pp. 370-380. https://doi.org/10.1016/j.ijer.2010.04.001

Bahri, S., Akmal, N., & Saputra, E. (2022). Application of 5s Culture in Mathematics for the Islamic Character Building in Elementary School Students. *International Journal of Trends in Mathematics Education Research*, *5*(1), 29–33. https://doi.org/10.33122/ijtmer.v5i1.103

Barak, M. & Assal, M. (2018). Robotics and STEM learning: students' achievements in assignments according to the P3 Task Taxonomy-practice, problem solving, and projects. *International Journal of Technology and Design Education*, 28(1), 121-144. https://doi.org/10.1007/s10798-016-9385-9

Baº, G. & Beyhab, Ö. (2017). Effects of multiple intelligences supported project-based learning on students' achievement levels and attitudes towards English lesson. *International Electronic Journal of Elementary Education*, 2(3), 365-386. https://www.iejee.com/index.php/IEJEE/article/view/245/241

Darmawan, E., Brasilita, Y., Zubaidah, S., & Saptasari, M. (2018). *Enhancing metacognitive skills of students with different gender using simas eric learning model at state senior high school 6 Malang. Biosfer: Journal of Biology Education, 11 (1), 48-57.* https://doi.org/10.21009/biosferjpb.11-1.5

Djamahar, R., Ristanto, R. H., Sartono, N., Ichsan, I. Z., & Muhlisin, A. (2018). Cirsa: designing instructional kits to empower 21 st century skill. *Educational Process: International Journal,* 7 (3), 200-208. http://dx.doi.org/10.22521/edupij.2018.73.4

Fajriana, F., Mursalin, M., & Fitriani, A. (2022). Development of Square and Triangle Surface Area Pocket Books as Learning Media for Junior High Schools. *International Journal of Trends in Mathematics Education Research*, *5*(1), 111–118. https://doi.org/10.33122/ijtmer.v5i1.128

Fitrianingsih, R. & Musdalifah. (2015). The Effectiveness of Using Video Media in Strapless Making Learning for Class XII Students of SMK Negeri 1 Jambu. *Fashion and Fashion Education Journal*, 4(1).1-6.

Hajeniati, N., & Kaharuddin, A. (2022). Innovation of the problem based learning model with contextual teaching learning in mathematics learning in the Industrial Revolution 4.0 era: A comparative case studies. *International Journal of Trends in Mathematics Education Research*, *5*(2), 222–227. https://doi.org/10.33122/ijtmer.v5i2.154

Hariastuti, R. M., Budiarto, M. T., & Manuharawati, M. (2019). From Culture to Classroom: Study Ethnomathematics in House of Using Banyuwangi. *International Journal of Trends in Mathematics Education Research*, *2*(2), 76–80. https://doi.org/10.33122/ijtmer.v2i2.60

Hartanto. (2017). *Implementation of the Think Talk Write (TTW) Learning Model with the Help of Student Worksheets to Improve Activities and Integrated Science Learning Outcomes for Class VII A Students of SMP Negeri 2* Rantau Panjang. *Journal of Innovation and Physics Learning*. 4(1). 10-17.

Hedi, H., Lusiani, A., Suryani, A., & Binarto, A. (2022). Forecasting COVID-19 cases for Top-3 countries of Southeast Asian Nation. *International Journal of Trends in Mathematics Education Research*, *5*(2), 191–198. https://doi.org/10.33122/ijtmer.v5i2.138

Hermanto, Didik., Budayasa, Ketut., Lukito, A. (2020). The Relational Thinking Process of Junior High School Students in Solving Contextual Mathematical Problems based on Gender Differences. *International Journal of Trends in Mathematics Education Research*, *3*(2), 855–865. https://doi.org/10.33122/ijtmer.v3i2.135

Herrmann, K. J., Bager-Elsborg, A., & McCune, V. (2017). Investigating the relationships between approaches to learning, learner identities and academic achievement in higher education. *Higher Education*, 74(3), 385-400. https://doi.org/10.1007/s10734-016-9999-6

Kurniawan, H., Darmono, P. B., Mursalin, M., Shang, Y., Weinhandl, R., & Sharm, R. (2022). Describe mathematical creative thinking skills and problem-solving strategies by prospective teacher students on non-routine problems. *International Journal of Trends in Mathematics Education Research*, *5*(2), 119–124. https://doi.org/10.33122/ijtmer.v5i2.140

Lumbantoruan, J. H., & Nadeak, B. (2022). Mathematics teacher competency analysis during online learning. *International Journal of Trends in Mathematics Education Research*, *5*(2), 214–221.https://doi.org/10.33122/ijtmer.v5i2.132

Mas' ud, M. I., & Wahid, A. (2022). Model SMEs digital disruption management with business model canvas and integer programming. *International Journal of Trends in Mathematics Education Research*, *5*(2), 162–168. https://doi.org/10.33122/ijtmer.v5i2.134

Matorevhu, A. (2019). Student Perceptions of Blended Assessment Approach in The Bachelor of Education Degrees in Mathematics And Science Through Open Distance And E–Learning (Odel). *International Journal of Trends in Mathematics Education Research*, *2*(1), 1–8. https://doi.org/10.33122/ijtmer.v2i1.109

Maulidah, N., Musyarofah, L., & Aulia, H. (2013). Think-Talk-Write (TTW) Strategy for teaching descriptive writing. *Journal of English Education STKIP PGRI Sidoarjo*, 1, 48-58.

Opticia, N. N., Khabibah, S., & Masriyah, M. (2022). Development of guided inquiry model mathematics learning tools to practice critical thinking skills for students in linear program materials. *International Journal of Trends in Mathematics Education Research*, *5*(2), 133–140. https://doi.org/10.33122/ijtmer.v5i2.95

Pandya, S. (2011). Interactive effect of Cooperative Learning Model and Learning Goals of Students on Academic Achievement of Student in Mathematics. *International Journal of Education*. (1). 27-34.

Pratiwi, V. U., Nurnaningsih, N., & Arianti, A. (2019). The Study of Using Introduction Themselves and Their Families Conversations in Teaching Speaking of 3rd Class Students of Elementary School. *International Journal for Educational and Vocational Studies*, *1*(7). https://doi.org/10.29103/ijevs.v1i7.1988

Putri, S., Abdurahman, A., Andrian, D., Angraini, L., & Effendi, L. (2022). Development of interactive multimedia based mathematics learning media macromedia flash 8. *International Journal of Trends in Mathematics Education Research*, *5*(2), 206–213. https://doi.org/10.33122/ijtmer.v5i2.133

Purnawan, R. A. (2014). Increasing biology learning result with cooperative learning type student teams achievement division (STAD). *Biosfer: Journal of Biology Education*, 7(1), 58-63. https://doi.org/10.21009/biosferjpb.7-1.9

Qurohman, M. T., Nugraha, P. P., Romadhon, S. A., & Fathurrohman, A. S. (2022). The influence of model of eliciting activities on improving mathematical problem-solving ability. *International Journal of Trends in Mathematics Education Research*, *5*(2), 141–146. https://doi.org/10.33122/ijtmer.v5i2.125

Rahmah, L. S. (2017). Improving students' score in writing descriptive text through Think Talk Write Strategy. *International Journal of English and Education*, 6(4), 180-193.

Risalah, D., & Hodiyanto, H. (2022). Mathematics communication as an alternative to overcome the obstacles of undergraduate students in mathematical proof. *International Journal of Trends in Mathematics Education Research*, *5*(2), 125–132. https://doi.org/10.33122/ijtmer.v5i2.141

Riski, Riska, Muh. Rizal, Linawati. (2017). Application of Think Talk Write (TTW) Cooperative Learning Model to Improve Student Learning Outcomes on the Relationship between Central Angle, Arc Length, and Area of Juring in Class VIII C of SMP Negeri 9 Palu. *Electronic Journal of Mathematics Education Tadulako*, 5(2). 175-190.

Ristanto, R. H., Zubaidah, S., Amin, M., & Rohman, F. (2018). From a reader to a scientist: developing cirgi learning to empower scientific literacy and mastery of biology concept. *Biosfer:Jurnal Pendidikan Biologi*,11(2), 90-100. https://doi.org/10.21009/biosferjpb.v11n2.90-100

Rofieq, A., Hindun, I., Shultonnah, L., & Miharja, F. J. (2021). Developing textbook based on scientific approach, critical thinking, and science process skills. *Journal of Physics: Conference Series*, *1839*(1), 12030. https://doi.org/10.1088/1742-6596/1839/1/012030

Sabilah, M., & Yolanda, F. (2022). Development of Mathematics Learning Devices with Problem Based Learning Model to Improve Student's Mathematical Connection Ability. *Journal of Education and Practice*, *5*(2), 180–190. https://doi.org/10.7176/jep/13-13-05

Saputra, E., Marhami, M., B, R., Mursalin, M., & Azmi, N. (2022). The development of media learning using plotagon software on circle material. *International Journal of Trends in Mathematics Education Research*, *5*(2), 147–153. https://doi.org/10.33122/ijtmer.v5i2.102

Sugiyono. (2006). *Qualitative and R&D Quantitative Research Methods*. Bandung: Alfabeta.

Sun, Z., Xie, K., & Anderman, L. H. (2018). The role of self-regulated learning in students' success in flipped undergraduate math courses. *The Internet and Higher Education*, 36, 41-53. https://doi.org/10.1016/j.iheduc.2017.09.003

Suparmi. (2012). Cooperative learning in multicultural education. *Journal of Educational Development: Foundations and Applications*, 1(1), 108-118.

Tarim, K. (2009). The Effect of Cooperative Learning on Preschooler Mathematics Problem Solving Ability. *International Journal of Mathematics Education*. (72). 325-340. https://doi.org/10.1007/s10649-009-9197-x

Tonra, W. S., Budiarto, M. T., Masriyah, M., & Tonra, W. S. (2019). Profile of High Order Thingking Skill (HOTS) of Junior High School Students' Grade 8 in Solving Linear Equation System Problems Based on Kinesthetic and Visual Learning Styles. *International Journal of Trends in Mathematics Education Research*, *2*(4), 212–214. https://doi.org/10.33122/ijtmer.v2i4.139

Umilasari, R., Saifudin, I., & Lestari, I. L. (2022). Star metric dimension of complete, bipartite, complete bipartite and fan graphs. *International Journal of Trends in Mathematics Education Research*, *5*(2), 199–205. https://doi.org/10.33122/ijtmer.v5i2.137

Wiadnyana, I. W. (2013). Application of Think-Talk-Write Type Cooperative Learning Strategy to Improve Student Civics Activities and Learning Outcomes. *PPKn Journal*, 1(4), 1.

Wigati, N. C., Sampoerno, P. D., Meiliasari, M., & Kusuma, J. W. (2022). Improving the ability to understand the concept of building space through PMRI-based with the help of smart classroom applications for students of primary school. *International Journal of Trends in Mathematics Education Research*, *5*(2), 154–161. https://doi.org/10.33122/ijtmer.v5i2.135

Wirda, Setiawan, D., & Hidayat. (2017). The effect of think talk write (ttw) learning method on the creative thinking ability of the students at primary school (sd) no.060856 medan, indonesia. *British Journal of Education*, 5 (11), 12-28.

Wiyak, W., Ansori, I., S. (2013). Think-Talk-Write (TTW) as a strategy to improve students' in teaching writing descriptive text: A case of tenth grade students of MAN Demak. *English Teaching Journal*, 4(1), 80-91. https://doi.org/10.26877/eternal.v4i1.1948

Zulkarnaini. (2011). Cooperative Model type of Think Talk Write (TTW) to improve the ability to write essays of description and critical thinking]. (Master's thesis). Indonesian University *of Education, Bandung.*