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Application Of Three-Dimensional (3D) Visual Learning Media In Cooperative Learning Model In Improving Student Learning Outcomes Of Class XI High School Students On Chemical Bonding Material

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Abstract

This research aims to see Application of Three-Dimensional (3D) Visual Learning Media in the Cooperative Learning Model in Improving Learning Outcomes of Class Xi High School Students on Chemical Bonding Material. The research location will be carried out at SMA Negeri 6 Pematangsiantar and the implementation time will be in the odd semester of the 2024/2025 academic year starting from August to September 2024. The sample is a subtest or part of the population selected to participate in the research. This sample is taken from a larger population and must be representative of that population so that the research results can be generalized. Research instruments are tools or devices used by researchers to collect data relevant to the research objectives. This instrument can take the form of a test, interview, observation, or other technological device that suits the type of data needed. The conclusion of this research is that the selection and application of three-dimensional visual learning media in the learning process can improve students' learning outcomes. This can be proven in this research by the increase in student learning outcomes in the experimental class as seen through the tcount value obtained, namely 18.094, this value is greater than the value in the ttable, namely 1.699 and for the sigi (2 tailed) value obtained, namely 0.000, smaller than The a value (0.05) means that in this case it can be concluded that there is an influence of three-dimensional visual learning media in improving the learning outcomes of class XI students on chemical bonding material.

Keywords: *Application, Three Dimensional (3d) Visual Learning Media, Cooperative Learning, Learning Outcomes*

INTRODUCTION

Education is very important in the development of a country and is also the main axis that is used as the foundation point for the founding of a country, this is because education is something that is inherent in human life. It is through education that human resources can be improved, where human resources themselves are the main asset/tool that will be used in developing a country (Pamungkas & Koeswanti, 2021).

Every country certainly has its own problems in the field of education, especially in Indonesia. Educational Problems themselves can be interpreted as problems that occur in the process of moral, social and economic maturation which are carried out with certain patterns of behavior to create human beings who are moral and responsible for the survival of society. In short, educational problems mean problems that occur in the implementation of educational activities (Gabriela, 2021).

Currently, the independent curriculum is becoming popular, where the Independent Curriculum itself has been implemented since 2021, where it is hoped that this curriculum can restore post-pandemic learning which has had a negative impact on students' learning abilities. Nowadays, the Independent Curriculum is also a hot topic of discussion because there are pros and cons to this curriculum. This is because there are different views regarding the implementation of the Independent Curriculum, many teachers complain that there are too many demands that must be fulfilled by teachers, especially in the administration section, where these demands have an impact on reducing teachers' time in teaching students. But there are also those who argue that the Independent Curriculum actually has a positive impact on a teacher, in that the Independent Curriculum provides many new things for a teacher and makes him more innovative and more sensitive to technological developments (Yenni, Syamswisna, & Marlina, 2018).

Talking about technology is no longer foreign to us because in the current era technology has become a very useful part of our lives and is always used and it could be said that it can no longer be separated. As an educator, technology has a very important role because it can be used as a supporting factor in the process of teaching and learning activities, namely by utilizing technology a teacher can create learning media that can help him improve student learning outcomes. Because as we know, many students don't like boring lessons, especially since these lessons contain calculations, so many students find it difficult. In research conducted byit is stated that the main cause of students' learning difficulties in studying chemistry is the lack of interest of students when studying chemistry, which makes the students' learning outcomes low. In the research results mentioned above, it was found that interest in learning has a close relationship which can influence student learning outcomes. Another research obtained results where from 84 students, some data was obtained which stated that only 53% of chemistry lessons in class were enjoyable, only 30% liked chemistry lessons and only 30% understood chemistry lessons (Pranata, Fikri, & Zulherman, 2022). From these studies, we can conclude that students' views on chemistry lessons have poor results. The background is that the majority of chemistry teachers still use conventional teaching methods so that student learning outcomes are reduced (Antara, 2022). Not only

conventional teaching methods , learning media also have a huge influence on student learning outcomes. Media is one of the most important aspects in encouraging successful learning because it will create good memories for students (Agustin, Margunayasa, & Kusmariyatni, 2019). When we as educators are able to foster students' interest in learning, of course it will be easier for students to follow and remember what is conveyed regarding the learning material. In this case, of course, it will also affect the learning outcomes of the students themselves. As in research (Qomario, Tohir, & Prastyo, 2022), data shows the low daily test scores of students studying chemical bonds, where students who have not yet reached the KKM (80) have an incomplete percentage of 55.7%, while students who have completed it are 44.3%. . And in research conducted by (Septian, Darhim, & Prabawanto, 2020), pre-research data was obtained, namely that there were 25 class This is detailed by giving practice questions to students. As many as 84% answered incorrectly regarding the definition of ionic bonds, and as many as 76% of students incorrectly explained the process of forming ionic compounds, 88% answered incorrectly in classifying compounds that have ionic bonds, and 56% of students were unable to identify the properties of compounds that have ionic bonds.

To improve student learning outcomes, one way we can use is to apply interesting learning media. Especially for chemistry lessons on chemical bonding material, this material can be said to be an abstract lesson so that students find it difficult to understand what chemical bonds actually are. In research conducted by (Purwati, Toto, & Afifi, 2019)it was found that the influence of innovative learning media can improve student learning outcomes. The research data obtained was the average value of student learning outcomes (posttest) in the experimental class was 73.81 and the control is 62.70. This is where the function of learning media is that apart from making it easier for teachers to transfer the knowledge they have, the media also helps students understand more easily. Maybe some chemistry teachers have used learning media but the media is not optimal in providing understanding regarding the material being taught, especially if the media used is only 2-dimensional images.

One learning media that can help teachers create learning media that has high quality values and can improve student learning outcomes is by using three-dimensional visual learning media that utilizes Augmented Reality technology. By utilizing this three-dimensional visual learning media, of course students can understand more clearly what chemistry really is and can increase students' interest in learning which will certainly provide good feedback in the form of increasing their learning outcomes for chemistry students (Badin, Sahjat, & Muhammad, 2019).

In research conducted by (Hasrudin & Asrul, 2020), results were obtained from 21 students, as many as 77.1% indicating "Agree" that three-dimensional visual learning media makes it easier for students to study the molecular shape and compounds of benzene and its derivatives and from 86.7% of the 21 students indicated that students "Strongly Agree" that it can also increase students' interest in learning. In the research (Darojat, Evayenny, & Ahmad, 2019)very satisfactory results were also obtained where the results of data analysis

showed that the t-count > t-table (4.134 > 2.021) with a significance level of 0.05. Based on the results of the Independent Sample t-Test, there is a significant increase between students who learn using three-dimensional visual learning media based on Augmented Reality and students who learn using PowerPoint media.

Based on the background above and the references that have been shown, learning media has a big influence on improving student learning outcomes. Therefore, researchers are interested in conducting research with the title "Application of three-dimensional (3D) visual learning media in the cooperative learning model in improving the learning outcomes of class XI high school students on chemical bond material."

METHODS

The type of research that will be applied in this research is quantitative research, because quantitative research uses statistical analysis, thus allowing researchers to test hypotheses strongly and identify patterns or relationships between variables more accurately and the research model used is an experimental model where with this model the research aims to test the cause-and-effect relationship between variables by controlling and manipulating the independent variable to see its effect on the dependent variable ((Sizi, Bare, & Galis, 2021). So in research, researchers create conditions that make it possible to isolate the influence of independent variables so that they can make more accurate conclusions about cause-and-effect relationships.

The research design used is Non-equivalent Control Group Design, which is an approach to quasi-experimental research that compares the experimental class with the control class without the researcher randomly selecting which individuals will be part of the experimental class and which individuals will be part of the experimental class. who fall into the control class.

In this research, before the intervention is carried out, each class will be given pretest questions that have been validated to measure student learning outcomes. After the intervention is carried out, the two classes will be given posttest questions which have also been validated to measure student learning outcomes again. After obtaining the necessary data, it will later be analyzed to determine changes in results that occur after the intervention is carried out.

The location of the research will be carried out at SMA Negeri 6 Pematangsiantar and the implementation time will be in the odd semester of the 2024/2025 Academic Year starting from August to September 2024 (Pour, Herayanti, & Sukroyanti, 2018).

The research population is the entire group of individuals, objects, or entities that have certain characteristics that are the focus or target of a research. The population includes all elements relevant to the research questions asked by the researcher (Susanto et al., 2024). In this study, the population was all class.

A sample is a subtest or part of a population selected to participate in research. This sample is taken from a larger population and must be representative of that population so that the research results can be generalized. Selecting the right sample is very important to ensure the validity and reliability of research findings (Creswell & Creswell, 2018). In accordance with the definition above, the sample in the study was two classes XI at SMA Negeri 6 Pematangsiantar selected using a purposive sampling technique, each consisting of 30 students.

Research instruments are tools or devices used by researchers to collect data relevant to the research objectives. This instrument can take the form of a test, interview, observation, or other technological device that suits the type of data needed. Selecting the right instrument is very important to ensure the validity and reliability of the data collected (Arthaningsih & Diputra, 2019).

What will be done in this research is to improve student learning outcomes by intervening on the dependent variable with intervention from the independent variable.

After the normality and homogeneity tests are fulfilled, hypothesis testing can be carried out. According to Arifin (2017), this hypothesis testing uses interference statistics with the help of the SPSS version 25 application, namely the paired sample t - test and the independent sample t - test in making decisions from existing hypotheses.

The test criteria carried out are if the value of tcount > ttable and the value of sig (2-tailed) < α (0.05) then H0 is rejected and H1 is accepted and if the value of tcount < ttable and Sig (2-tailed) > α (0.05) then H0 is accepted and H1 is rejected.

RESULTS AND DISCUSSION

Description of Research Results

Validity Test

Validity test is the level of reliability and validity of the measuring instrument used. The validity test was carried out on the pre-test and post-test questions, where the validity test was carried out using the SPPS version 25 application which is presented in the table below:

Table 1.
SPSS 25 Validity Test

Keterangan	Jumlah Soal
Valid	20
Tidak Valid	10

Normality Test

After obtaining data on student learning outcomes through pre-test and post-test in the control and experimental classes, the Shapiro-Wilk normality test was first carried out on the basis of decision making if the sig value > 0.05 then the data is normally distributed and if the sig value < 0.05 means the data is not normally distributed. The following are the results of the normality test on SPSS version 25.

Table 2.
Normality Test Output.

Tests of Normality

	Kelas	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Hasil Belajar	Pre_Test Kelas Kontrol	0,131	30	0,199	0,975	30	0,682
	Post_Test Kelas Kontrol	0,127	30	.200*	0,942	30	0,104
	Pre_Test Kelas Eksperimen	0,126	30	.200*	0,964	30	0,401
	Post_Test Kelas Eksperimen	0,140	30	0,138	0,954	30	0,215

From the table above it can be seen that the significance value obtained is more than 0.05, which means that the data is normally distributed.

Homogeneity Test

The homogeneity test is used to determine that two or more groups of sample data come from populations that have the same variance as the basis for decision making. If the significance value obtained is > 0.05, then the variance of each sample is the same (homogeneous). If the significance obtained is <0.05, then the variance of each sample is not the same (not homogeneous). Following are the results of the homogeneity test:

Table 3.

Homogeneity Test Output

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Hasil Belajar	Based on Mean	0,628	3	116	0,598
	Based on Median	0,645	3	116	0,587
	Based on Median and with adjusted df	0,645	3	113,122	0,587
	Based on trimmed mean	0,611	3	116	0,609

From the SPSS version 25 output above, it can be seen that the significance value obtained is more than 0.05, which means the data obtained from the sample is homogeneous.

Hypothesis Testing

Hypothesis testing is a test carried out to answer or find conclusions from the proposed hypothesis. In research to get real decisions from Hypothesis Testing, the following tests need to be carried out:
Paired Sample T – Test
Paired Sample t Test - Test is used to find out whether there is a difference in the average value of two sample data that are related/the same. Below are the results of the paired sample t – test:

Table 4.

Output Paired Sample Statistics

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre_Test_Eksperimen	49,67	30	8,899	1,625
	Post_Test_Eksperimen	84,50	30	7,468	1,364

In the table above, it can be seen that the average score (mean) in the post-test is higher than the average score (mean) in the pre-test. In this case, it indicates that there is an increase in the value of student learning outcomes after the intervention

Table 5.

Paired Sample T – Test Output

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	Interval of the Lower	Upper			
Pair 1	Pre_Test_Eksperimen - Post_Test_Eksperimen	-34,833	10,544	1,925	-38,771	-30,896	-18,094	29	0,000

In the SPSS output above, it can be seen that the two-tailed significance value obtained is 0.000, which is smaller than 0.05, so there is a significant difference between the pre-test and post-test values.

Decision making in hypothesis testing is seen by comparing the tcount value with ttable. For the tcount value obtained, namely 18.094, this value is greater than the value in ttable, namely 1.699 and for the sig (2 tailed) value obtained, namely 0.000, which is smaller than the α value (0.05), so in this case H0 is rejected and H1 is accepted.

Independent Sample T – Test

The independent sample t-test is a statistical test that compares the averages of two independent sample groups (post-test results from the control class with the experimental). The following are the results of the independent sample t – test:

Table 6.

Output Group Statistics Independent Sample T – Test.

Group Statistics

Kelompok		N	Mean	Std. Deviation	Std. Error Mean
Hasil_Belajar	Post_Test_Kelas_Kontrol	30	76,83	8,355	1,525
	Post_Test_Kelas_Eksperimen	30	84,50	7,468	1,364

In the table above, it can be seen that the average value obtained from the post-test results of the control and experimental classes has a difference in that the average post-test value of the experimental class is higher than the control class, which indicates that there is a positive influence from the application of visual learning media. three dimensions.

Table 7.

Independent Sample T – Test Output

Independent Samples Test										
		Equality of Variances		t-test for Equality of Means						
									Interval of the	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Hasil_Belajar	Equal variances assumed	0,802	0,374	-3,747	58	0,000	-7,667	2,046	-11,762	-3,571
	Equal variances not assumed			-3,747	57,286	0,000	-7,667	2,046	-11,763	-3,570

In the SPSS output above, it can be seen that for the independent sample test - the test carried out for the sig (2 tailed) value was obtained, namely 0.000, which is smaller than the α value (0.05), which means there is a significant influence between the control class and the experimental class.
In making decisions on hypothesis testing, it can also be seen by comparing the tcount value with ttable. For the tcount value obtained, namely 3.747, this value is greater than the value in ttable, namely 1.671, and for the sig (2 tailed) value obtained, namely 0.000, which is smaller than the α value (0.05), so in this case H0 is rejected and H1 is accepted.

Research Discussion

This research was conducted to find out how effective the application of three-dimensional visual learning media is in the cooperative learning model in improving the learning outcomes of class XI high school students on chemical bond material. The results of this research indicate success in applying three-dimensional visual learning media to student learning outcomes.
This success can be seen from the comparison of pre-test and post-test results in the control and experimental classes. Before being given to students, the pre-test and post-test questions were validated, of the 30 questions validated, 20 questions were valid and 10 questions were invalid. The validity of the questions can be seen by comparing the calculated r value with the product moment r table value, where the r table value used is 0.374. If the calculated r value is > the r table value then the question is said to be valid and vice versa (Jufriadi, Huda, Aji, Pratiwi, & Ayu, 2022).
After the validity test is carried out, the reliability test is then carried out. For the reliability test, a Cronbach alpha value of 0.764 was obtained, which is a value greater than 0.6. In accordance with the basis for decision making in the Cronbach alpha reliability test, if the Cronbach alpha value obtained is greater than 0.6 then the instrument used is reliable (Rahmawati & Permata, 2018).
Next, a question differentiation power test is carried out which aims to determine the ability of the instrument (questions) used to differentiate the ability of the questions or it could be said to see which questions can be used or not in testing. The results of this differential power test showed that 15 questions were in the fair category, 5 questions were in the good category and the remaining 7 questions were in the bad category and 3 questions were in the very bad category.
The question difficulty test is carried out to assess the questions used so that they are not too difficult and not too easy. The test results for the level of difficulty of the questions contained 4 questions with easy criteria, and 16 other questions included in the medium criteria (Magfirah, Maidiyah, & Suryawati, 2019).

After the instrument or questions to be used have gone through several tests which can be declared suitable for use, the questions will be given to students in the form of pre-test and post-test questions in each control and experimental class with a total of 30 students in each class. each control and experimental class (Khishaaluhussaniyyati, Faiziyah, & Sari, 2023).

Data on student learning outcomes obtained from pre-test and post-test results in the control and experimental classes were subjected to normality tests, homogeneity tests and hypothesis tests. For the normality test used was the Shapiro Wilk normality test with the results obtained a significance value greater than 0.05, which means the data is normally distributed. After that, it was continued with the homogeneity test with the results obtained, namely the significance value obtained was more than 0.05, which indicated that the data obtained were the same (homogeneous) (Hermiyanto & Wahyudi, 2022).

After the normality and homogeneity tests have been carried out, a hypothesis test is carried out. This test aims to prove the temporary conclusions proposed (Prabaningrum & Putra, 2019). In hypothesis testing there are 2 methods used, the first is by using the paired sample t – test and the independent sample t – test, in both of these tests it was found that H0 was rejected and H1 was accepted (Aeni, Djuanda, Maulana, Nursaadah, & Sopian, 2022).

For H0 to be rejected and H1 to be accepted, it can be seen first in the paired to t-test with the results that the t-count value obtained is 18.094, this value is greater than the value in the t-table, namely 1.671 and for the sig (2 tailed) value obtained, it is 0.000 more. is smaller than the α value (0.05), then in this case H0 is rejected and H1 is accepted. In this test it can also be seen that the average pre-test score was 49.67 and after the intervention there was an increase in learning outcome scores which can be seen from the average post-test score of 84.50 in the experimental class (Nurfiani, 2016).

Next, an independent sample t - test was carried out to strengthen decision making in hypothesis testing. The independent sample t-test was carried out by comparing the average post-test value of the control class with the experimental class. For the results of this test, the tcount value obtained is 3.747, this value is greater than the value in the ttable, namely 1.671 and for the sig (2 tailed) value obtained, namely 0.000, it is smaller than the α value (0.05), so in this case H0 rejected and H1 accepted. In the test, differences in learning outcomes were also obtained between the control and experimental classes after the intervention, with the average post-test score in the control class being 76.83, while in the experimental class the post-test average score was higher, namely 84.50. also indicates that the application of three-dimensional visual learning media is more effective and has an influence on student learning outcomes (Anugrah, Istiningsih, & Zain, 2022).

The results of this research are also in line with research conducted by (Jauhar & Nur, 2022) with the results of data analysis obtained with t-count > t-table (4.134 > 2.021) with a significance level of 0.05. Based on the results of the independent sample t - test, there was a significant increase between students who learned to use three-dimensional visual learning media and students who did not use it (Aidah & Nurafni, 2022).

CONCLUSION

The conclusion of this research is that the selection and application of three-dimensional visual learning media in the learning process can improve students' learning outcomes. This can be

proven in this research by the increase in student learning outcomes in the experimental class as seen through the tcount value obtained, namely 18.094, this value is greater than the value in the ttable, namely 1.699 and for the sigi (2 tailed) value obtained, namely 0.000, smaller than The α value (0.05) means that in this case it can be concluded that there is an influence of three-dimensional visual learning media in improving the learning outcomes of class XI students on chemical bonding material.

REFERENCES

Aeni, A. N., Djuanda, D., Maulana, M., Nursaadah, R., & Sopian, S. B. P. (2022). PENGEMBANGAN APLIKASI GAMES EDUKATIF WORDWALL SEBAGAI MEDIA PEMBELAJARAN UNTUK MEMAHAMI MATER PENDIDIKAN AGAMA ISLAM BAGI SISWA SD. *Primary: Jurnal Pendidikan Guru Sekolah Dasar*, *11*(6), 1835. https://doi.org/10.33578/jpfkip.v11i6.9313

Agustin, N. K. T. J., Margunayasa, I. G., & Kusmariyatni, N. N. (2019). Pengaruh Model Pembelajaran Tps Berbantuan Media Visual Terhadap Hasil Belajar IPA. *Journal for Lesson and Learning Studies*, *2*(2), 239–249.

Aidah, N., & Nurafni, N. (2022). ANALISIS PENGGUNAAN APLIKASI WORDWALL PADA PEMBELAJARAN IPA KELAS IV DI SDN CIRACAS 05 PAGI. *PIONIR: JURNAL PENDIDIKAN*, *11*(2). https://doi.org/10.22373/pjp.v11i2.14133

Anugrah, A., Istiningsih, S., & Zain, M. I. (2022). Pengembangan Media Pembelajaran Wordwall Berbasis Game Edukasi Pada Mata Pelajaran IPS Kelas VI SDN 48 Cakranegara. *Pendagogia: Jurnal Pendidikan Dasar*, *2*(3), 208–216. Opgehaal van https://jurnal.educ3.org/index.php/pendagogia/article/view/81

Arthaningsih, N. K. J., & Diputra, K. S. (2019). Pengaruh Model Pembelajaran Kooperatif Tipe Two Stay Two Stray melalui Lesson Study terhadap Hasil Belajar Matematika. *Journal of Education Technology*, *2*(4), 128. https://doi.org/10.23887/jet.v2i4.16424

Badin, I., Sahjat, S., & Muhammad, N. (2019). Pengaruh Model Pembelajaran Kooperatif Tipe Talking Stick terhadap Hasil Belajar Siswa Kelas VIII-C SMP Negeri 7 Kota Ternate pada Konsep Getaran dan Gelombang. *SAINTIFIK@*, *4*(2). https://doi.org/http://dx.doi.org/10.33387/sjk.v4i2.1376

Darojat, Z., Evayenny, E., & Ahmad, A. (2019). Pengaruh Model Pembelajaran Kooperatif Tipe Talking Stick terhadap Hasil Belajar PPKn. *Prosiding Seminar Nasional Pendidikan STKIP Kusuma Negara*.

Gabriela, N. D. P. (2021). Pengaruh Media Pembelajaran Berbasi Audio Visual Terhadap Peningkatan Hasil Belajar Sekolah Dasar. *Mahaguru: Jurnal Pendidikan Guru Sekolah Dasar*, *2*(1), 104–113.

Hasrudin, F., & Asrul, A. (2020). Pengaruh Model Pembelajaran Kooperatif Tipe Talking Stick Terhadap Hasil Belajar Siswa pada Pelajaran IPA di SD Inpres 16 Kabupaten Sorong. *Jurnal Papeda: Jurnal Publikasi Pendidikan Dasar*, *2*(2), 94–102. https://doi.org/10.36232/jurnalpendidikandasar.v2i2.521

Hermiyanto, D. L., & Wahyudi, W. (2022). Pengembangan Media Pembelajaran Pomewall (Media Pop Up dan Game Wordwall) untuk Pembelajaran Siswa Kelas V di Sekolah Dasar. *JIIP - Jurnal Ilmiah Ilmu Pendidikan*, *5*(11), 4644–4648.

https://doi.org/10.54371/jiip.v5i11.1104

Jauhar, S., & Nur, N. (2022). Analisis Penggunaan Media Pembelajaran Wordwall Berbasis TPACK pada Pembelajaran IPS Siswa Kelas V SDS IT Rabbani Kecamatan Tanete Riattang Kabupaten Bone. *Global Journal Teaching Professional*, *1*(3), 371–378.

Jufriadi, A., Huda, C., Aji, S. D., Pratiwi, H. Y., & Ayu, H. D. (2022). ANALISIS KETERAMPILAN ABAD 21 MELALUI IMPLEMENTASI KURIKULUM MERDEKA BELAJAR KAMPUS MERDEKA. *Jurnal Pendidikan dan Kebudayaan*, *7*(1), 39–53. https://doi.org/10.24832/jpnk.v7i1.2482

Khishaaluhussaniyyati, M., Faiziyah, N., & Sari, C. K. (2023). Analisis Kemampuan Berpikir Kritis Siswa Kelas 10 SMK Dalam Menyelesaikan Soal HOTS Materi Barisan Dan Deret Aritmetika Ditinjau Dari Self Regulated Learning. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, *7*(1), 905–923.

Magfirah, M., Maidiyah, E., & Suryawati, S. (2019). Analisis kesalahan siswa dalam menyelesaikan soal cerita matematika berdasarkan prosedur newman. *Lentera Sriwijaya: Jurnal Ilmiah Pendidikan Matematika*, *1*(2), 1–12. https://doi.org/https://doi.org/10.36706/jls.v1i2.9707

Nurfiani, F. (2016). *Penerapan Model Pembelajaran Kooperatif Tipe Team Asissted Individualization Untuk Meningkatkan Kemampuan Komunikasi Matematika Dan Kemampuan Pemecahan Masalah Serta Dampaknya Terhadap Kemandirian Belajar siswa*. UNPAS.

Pamungkas, W. A. D., & Koeswanti, H. D. (2021). Penggunaan Media Pembelajaran Video Terhadap Hasil Belajar Siswa Sekolah Dasar. *Jurnal Ilmiah Pendidikan Profesi Guru*, *4*(3), 346. https://doi.org/10.23887/jippg.v4i3.41223

Pour, A. N., Herayanti, L., & Sukroyanti, B. A. (2018). Pengaruh Model Pembelajaran Talking Stick terhadap Keaktifan Belajar Siswa. *Jurnal Penelitian dan Pengkajian Ilmu Pendidikan: e-Saintika*, *2*(1), 36. https://doi.org/10.36312/e-saintika.v2i1.111

Prabaningrum, I. G. A. I., & Putra, I. K. A. (2019). Pengaruh Model Pembelajaran Kooperatif Team Assisted Individualization Berbantuan Media Semi Konkret Terhadap Kompetensi Pengetahuan Matematika. *Jurnal Ilmiah Sekolah Dasar*, *3*(4), 414. https://doi.org/10.23887/jisd.v3i4.21775

Pranata, K., Fikri, A. N., & Zulherman, Z. (2022). Pengaruh Media Pembelajaran Audio Visual Melalui Zoom Terhadap Hasil Belajar Siswa Sekolah Dasar. *EDUKATIF : JURNAL ILMU PENDIDIKAN*, *4*(4), 6231–6240. https://doi.org/10.31004/edukatif.v4i4.2982

Purwati, M., Toto, T., & Afifi, R. (2019). Perbedaan Pengaruh Model Pembelajaran Kooperatif Tipe Talking Stick dan Tipe Role Playing terhadap Aktivitas dan Hasil Belajar Kognitif Siswa (Penelitian Pada Sub Konsep Sistem Ekskresi Manusia di Kelas XI SMAN 1 Ciamis). *Jurnal Wahana Pendidikan*, *5*(1), 99–107.

Qomario, Q., Tohir, A., & Prastyo, C. (2022). Math poster with augment reality to increase learning outcome of students' high school. *International Journal of Trends in Mathematics Education Research*, *5*(1), 69–73. https://doi.org/10.33122/ijtmer.v5i1.106

Rahmawati, D., & Permata, L. D. (2018). Analisis kesalahan siswa dalam menyelesaikan soal

cerita program linear dengan prosedur newman. *Jurnal Pembelajaran Matematika*, *5*(2).

Septian, A., Darhim, & Prabawanto, S. (2020). Mathematical representation ability through geogebra-assisted project-based learning models. *Journal of Physics: Conference Series*, *1657*(1), 012019. https://doi.org/10.1088/1742-6596/1657/1/012019

Sizi, Y., Bare, Y., & Galis, R. (2021). Pengaruh Model Pembelajaran Kooperatif Tipe Talking Stick Terhadap Keaktifan dan Hasil Belajar Kognitif Peserta Didik SMP Kelas VIII. *Spizaetus: Jurnal Biologi dan Pendidikan Biologi*, *2*(1), 39. https://doi.org/10.55241/spibio.v2i1.30

Yenni, Y., Syamswisna, S., & Marlina, R. (2018). Pengaruh Media Pembelajaran Audiovisual Terhadap Hasil Belajar Siswa Materi Sel Kelas Xi Mia SMA. *Jurnal Pendidikan Dan Pembelajaran Khatulistiwa*, *7*(9). https://doi.org/http://dx.doi.org/10.26418/jppk.v7i9.27915