At- Tarbawi: Journal of Education, Social and Culture
e-ISSN: 2086-9754/p-ISSN: 2086-9754
Volume 11 Number 2 2024
doi: 10.32505/tarbawi.v11i2.9352

The Influence of Teaching Methods and Learning Media on Learning Outcomes Students: a Quasi-Experimental Study

Received: August 28, 2024
Accepted: October 10, 2024
Published: December 29, 2024

Fatnan Asbupel[1*]; Lia Angela[2]; Muhammad Alfian[3]
Institut Agama Islam Negeri Kerinci, Indoensia[123]
*Contributor E-mail: asbupelfatnan@gmail.com

Abstract

This study aims to determine the effect of teaching methods and learning media on student learning outcomes in chemistry subjects, as well as the interaction between the two. This study is a quasi-experiment with a 2x2 factorial Completely Randomized Design (CRD) design, which considers moderator variables that may affect the relationship between independent and dependent variables. The study population was grading the instrument used was a multiple-choice objective test whose validity was tested logically and empirically. The homogeneity test used the Levene Test and the hypothesis was tested using Two-Way Analysis of Variance (Two Way ANOVA). The results showed that: (1) the PBL teaching method provided higher chemistry learning outcomes than the conventional method ($p = 0.023 < \alpha = 0.05$); (2) the use of audiovisual media produced higher learning outcomes than visual media ($p = 0.000 < \alpha = 0.05$); and (3) there is no significant interaction between teaching methods and learning media in influencing chemistry learning outcomes ($p = 0.317 > \alpha = 0.05$). This shows that teaching methods and learning media have an independent influence on chemistry learning outcomes.

Keywords: Completely Randomized Design, Media, Learning Outcomes, and Teaching Methods

Abstrak

Penelitian ini bertujuan untuk menganalisis pengaruh metode pengajaran dan media pembelajaran terhadap hasil belajar siswa pada mata pelajaran kimia, serta mengevaluasi apakah terdapat interaksi antara keduanya. Peneliti menggunakan desain eksperimen semu (quasi eksperimen) dengan rancangan acak lengkap (RAL) faktorial 2x2, yang juga mempertimbangkan variabel moderator yang mungkin mempengaruhi hubungan antara variabel bebas dan terikat. Populasi penelitian terdiri dari siswa kelas XI SMA Negeri 1 Sungai Penuh, dengan sampel sebanyak 120 siswa. Instrumen yang digunakan berupa tes obyektif pilihan ganda, yang telah diuji validitasnya secara logis dan empiris. Uji homogenitas dilakukan menggunakan Levene Test, sementara pengujian hipotesis menggunakan Analisis Varians dua jalur (Two Way ANOVA). Hasil penelitian

menunjukkan (1) metode pengajaran PBL menghasilkan skor hasil belajar kimia yang lebih tinggi dibandingkan metode pengajaran konvensional ($p = 0,023 < \alpha = 0,05$); (2) media audiovisual memberikan hasil belajar yang lebih baik dibandingkan media visual ($p = 0,000 < \alpha = 0,05$); dan (3) tidak terdapat interaksi signifikan antara metode pengajaran dan media pembelajaran dalam mempengaruhi hasil belajar kimia ($p = 0,317 > \alpha = 0,05$). Ini menunjukkan bahwa metode pengajaran dan media pembelajaran memberikan pengaruh secara terpisah terhadap hasil belajar kimia

Kata Kunci: Metode mengajar, Media, Hasil Belajar, dan Rancangan Acak Lengkap

Introduction

Success in field education a country depends on the efforts made for repair quality education. Government owns not quite enough answer important in repair quality education, especially in the sector formal education. Improvement this is very related with role student as participant students and teachers as teacher (Warzukni et all, 2023). Success education can measure from how much active student in the learning process, which is influenced by various factors, including student That themselves, parents, and teachers. Education is expected capable produce creative , innovative and skilled generation in technology , as well as own ability good communication and cooperation as well as ability think critical in solve problem (Pane & Darwis Dasopang, 2017) . Furthermore, according to Rahmat et al. (2020), the integration of active learning strategies significantly influences students' cognitive, affective, and psychomotor development, emphasizing the essential role of interactive learning environments in achieving educational success.

Government efforts for increase quality education covers several step improvements, such as revision curriculum, training for teachers, improvement textbooks, and additions tool display. However , the results achieved Not yet fully fulfil hope (Siahaan et al., 2023). Improvement This need participation from various parties, including teachers, parents, students, and the community. Quality education is highly dependent on the learning process teaching (PBM), with results the expected ending in accordance with standard curriculum (Setiyawan, Tri, & Sutarto, 2012). For reach results optimal learning , students must can understand , explain , and apply material studied (Kasyadi et al., 2018 ; Suyuti et al., 2023) . Achievements optimal learning is influenced by supportive conditions effective learning and development ability exploration Good physique and mentally (Kartini & Putra, 2020).

Instructional Media is component important in increase quality education with method improve the learning process teaching and results Study students. Use of learning media can (1) improve interest and motivation student for learn, (2) clarify material learning so that easier understood, (3) enrich method teaching so that no only relies on the teacher's verbal communication, and (4) improves involvement active student through activity like observation, recording, and demonstration (Ameliya). Use of appropriate media can make learning more interesting and easy understanding material (Leuwol et al., 2023) (Marliani, 2021) disclose that various media can used for support success of learning process teach, facilitate student in understand and master the concepts taught.

In observation learning chemistry in even semester in 2024, it was discovered several problems, such as low performance Study students. The cause including lack of enthusiasm student in follow lessons and lack of seriousness in finish assignments. Students also often feel bored Because method learning used feel monotonous. Conventional methods (teacher-centered) are often applied tend make student passive and not involved in a way active. Inactivity This make student reluctant ask If experience difficulty in understand material (Karim, 2021). On the other hand, the method such as Problem-Based Learning (PBL) or Learning Based on Problem (PBM) encourages involvement active students. In the context of learning chemistry, application problem real as context learning can help student develop skills think critically and solving problem. Problem-Based Learning (PBL) is method teaching that utilizes problem real For practice student in skills think critical and solving problem (Mudrikah, 2021). Novili et al., 2017 explain that PBL is approach curriculum that prioritizes role active student in finish problem that is not structured with good. Therefore, that's important for evaluate impact method teaching and learning media to results Study student in eye lesson chemistry, as well as interaction between both.

Method

Study This apply design experiment quasi - experimental with objective main for compare results Study student in eye lesson chemistry based on use method different teaching and learning media. In addition, research it also focuses on analysis influence second variable the to achievement results Study student. Study This use method experiment with design Completely Randomized Design (CRD) factorial 2x2. This design considers possibility existence moderator variables that can influence connection between variable free and variable bound. Paradigm design factorial the can explained in table 1.

Table 1 *Factorial Design* (2x2 Factorial Design)

Teaching Method (A)	**Learning Media (B)**	
	Visual Media (B1)	**Audiovisual Media (B2)**
Conventional Method (A1)	A1B1	A1B2
PBL Method (A2)	A2B1	A2B2

Based on design study there are 4 groups in a learning namely (1) the group that studies with method conventional using visual media (A1B1), (2) learning groups with method conventional using audiovisual media (A1B2), (3) learning groups with PBL method uses visual media (A2B1) and (4) learning groups with PBL method using audiovisual media (A2B2).

Population study This consists of from students of State Senior High School 1 Sungai Penuh, the total of which is totaling 1,020 people. The sample used in study This is part from student class XI in the high school, namely 342 students spread across 10 classes. The selection sample done with use simple random sampling. The selection process sample done with method draw student from each class, so that 120 students selected class XI which has characteristics similar as sample research. Then 120 students the shared into 4 groups in accordance with design study This.

Data collection in study This done through test or test. test This given after student get treatment in the form of use method teaching and learning media certain as part from experiment. The purpose of implementation test This is for measure results Study students in the eye lesson chemistry. Instruments used in study This is test. The test used shaped choice double, consisting of 20 questions with five options answers, and assessments use scale 0-100. Test This aiming for measure results Study students on aspects cognitive. The material being tested covers understanding properties solution sour language, method its measurement, and its application. Expected competencies from student includes (1) describing theories sour language with determine characteristic solution and calculate pH, (2) calculate amount reactants and products reaction in solution electrolyte based on results titration sour language, and (3) using curve pH changes in titration sour language for explain draft solution buffer and hydrolysis.

In the research this, validity test measured through two types validity, namely validity logical and valid empirical. Analysis of test items done using the ITEMAN program to evaluate every grain test. Instrument stated reliable if Cronbach Alpha value obtained exceeds 0.60 (Ramadhan et al., 2024). Prerequisite test in analysis study This involves

homogeneity test. Homogeneity test variance in study This done with using Levene Test. In research this, hypothesis tested use analysis two-way variance for evaluate the influence of two variables free, namely method teaching and learning media, towards variable bound in the form of results Study students. Analysis This aiming for identify existence difference results Study chemistry based on method teaching and media used. Decision regarding reception or rejection of H_0 is done with analyze mark significance contained in the table test of between subject effect results from analysis variance using the SPSS 19.0 for Windows program. If the p value is smaller of 0.05, then H0 is rejected and Ha is accepted.

Results and Discussion

An instrument considered valid if capable measure what is it should measure. Validity instrument can state achieved If mark phi bigger from r_{table}. Based on validity test results instrument test results Study chemistry analyzed using the ITEMAN program, obtained the results are presented in Table 2.

Table 2 Validity Decision Instrument Chemistry Learning Outcome Test

Decision	Amount	No Item
Valid	17	1, 2, 4, 5,6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20
Fall	3	3, 8, 18

From the results analysis conducted with using ITEMAN, there are 20 items question choice double tested. After analyze coefficient point biserial correlation, found that 3 questions, namely numbers 3, 8, and 18, stated invalid. While that, 17 questions other considered valid. Invalid questions are not will deleted in a way directly, but will fixed based on recommendation from the experts. Based on results analysis grain question use device ITEMAN software, coefficient reliability test results obtained is of 0.635. With mark this, can concluded that instrument the test used own level adequate reliability.

Table 3 Results of Homogeneity Test Instrument Chemistry Learning Outcome Test

Levene's Test of Equality of Error Variances			
F	**df1**	**df2**	**Sig.**
.194	3	56	.900

From Table 3 we can see that mark significance results p calculation bigger from mark significance α = 0.05. With thus the data nature homogeneous and fulfilling assumption for statistical tests were conducted parametric. In research this, hypothesis test done with use analysis Two Way ANOVA for test three different hypotheses. Hypothesis first tested is about influence method teaching to results Study students. In case This, H0 states that no there is difference results Study students caused by the

method applied teaching, while H_a to argue that method teaching own significant impact to results Study students. Hypothesis second to study the influence of learning media to results Study students, with H_0 mention that learning media No influence results study, while H_a state that there are difference results Study students caused by the type of learning media used. Hypothesis third evaluate interaction between method teaching and learning media, where H_0 to argue that No There is interaction between second factor the in-influence results learning, while H_a state that There is interaction significant between method teaching and learning media that influence results Study student. From the results analysis use *the SPSS 19.0 for Window* program then obtained:

Table 4 *Between-Subject Factors*

Between-Subjects Factors			
		Value Label	N
Method	1	Conventional	30
	2	PBL	30
Me and him	1	Visual	30
	2	Audiovisual	30

Table 4 shows factors between subject in study This. This table identify four the tested group based on two factors main: method teaching and learning media. For factor method teaching, there are two groups, namely group that uses method conventional with 30 students, and the group that uses Problem-Based Learning (PBL) method with 30 students. While For learning media factors, there are also two groups, namely group using visual media with 30 students, and group using audiovisual media with 30 students. With Thus, every combination method teaching and learning media consists of from 30 students, resulting in a total of 120 students in study This.

Table 5 *Descriptive Statistics*

Dependent Variable:value				
Method	**M e he**	**Mean**	**Std Deviation**	**N**
Conventional	visual	64.5333	11.33809	15
	Audiovisual	76.4000	9.40213	15
	Total	70.4667	11.88083	30
PBL	visual	68.0000	10.67708	15
	Audiovisual	85.1333	8.83068	15
	Total	76.5667	12.98456	30
Total	visual	66.2667	10.96368	30
	Audiovisual	80.7667	10.00236	30
	Total	**73.5167**	**12.71659**	**60**

Descriptive Table *Statistics* displays the average value, standard deviation, and number of samples. In the average column, there are differences in learning outcomes based on the method. teaching and learning media used, where Audiovisual media provide better learning outcomes than visual media and methods. teach PBL provides better learning outcomes than other methods. teach conventional.

Table 6 *Tests of Between-Subjects Effects*

Tests of Between-Subjects Effects					
Dependent Variable:value					
Source	Type III Sum of Squares	df	Mean Square	F	Sig .
Corrected Model	3815.917 [a]	3	1271.972	12,442	.000
Intercept	324282.017	1	324282.017	3.172E3	.000
Method	558.150	1	558.150	5,460	.023
M e he	3153.750	1	3153.750	30,849	.000
method * me dia	104,017	1	104,017	1,017	.317
Error	5725.067	56	102.233		
Total	333823.000	60			
Corrected Total	9540.983	59			
a. R Squared = .400 (Adjusted R Squared = .368)					

Table 6 presents effect test results between subject for variable dependent, namely mark results Study students. From the table this, can interpreted as following

1. Correction Model show F value of 12.442 with significance p < 0.001, which means the model significant in a way statistic in explain variation mark results Study students. With R Squared of 0.400 (Adjusted R Squared = 0.368), this model explains about 40% of variability mark student.
2. Intercept shows a very high F value, namely 3172, with significance p < 0.001, confirms that the intercept model contributes in a way significant to variation mark.
3. Teaching Methods show F value of 5.460 with significance p = 0.023. This shows that method teaching own effect significant to results Study students, with difference mark between method applied teaching.
4. Instructional Media own F value of 30.849 with significance p < 0.001, indicating that learning media also has an influence significant to results Study student.
5. Interaction between Method and Media shows F value of 1.017 with significance p = 0.317, which indicates that No There is interaction significant between method teaching and learning media in influence results Study student.

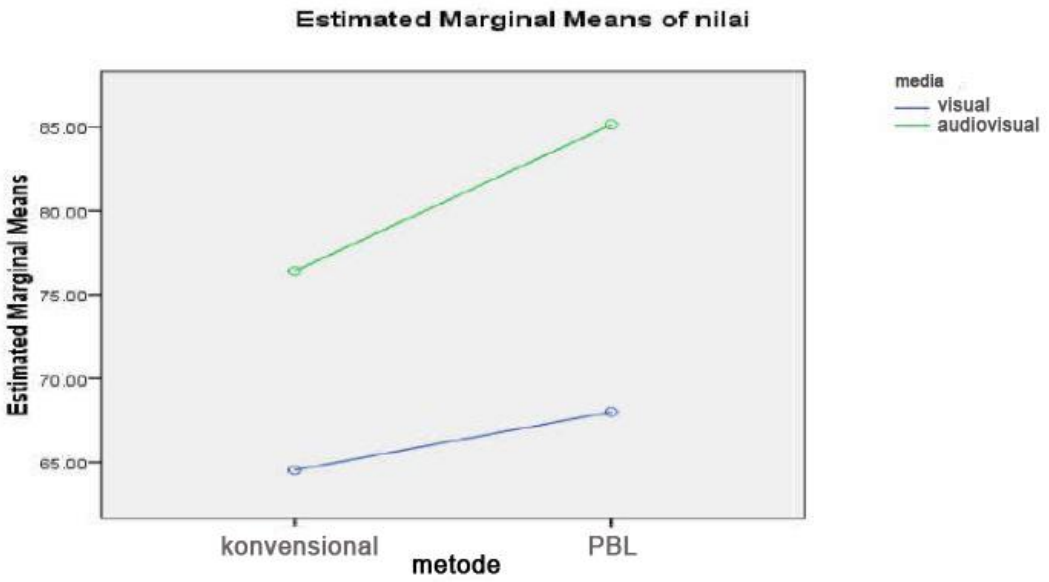

Figure 1. *Estimated Marginal Means* Graph *of value*

Chart from *Estimated Marginal Means* show that method teaching conventional and Problem-Based Learning (PBL), when applied with various types of learning media (both visual and audiovisual), produce two parallel lines. This is indicating that No There is interaction significant between method teaching and learning media. From the results of the test, it can be concluded that second factors, namely method teaching and types of learning media, respectively significant influence improvement results Study students, but No There is interaction between method teaching and media used.

Discussion

Study This show that there is difference significant in results Study students who are taught with method conventional compared to with method Learning Based on Problem Solving (PBL). PBL method is proven more superior in increase achievement results Study student compared to method conventional (Dewi et al., 2014) . In the learning process , a number of element important like curriculum , teachers, students , learning media , and environment Study must integrated with good for the purpose education can achieved in a way maximum (Setyosari, 2017; Sapriyah, 2019; Hidayat, 2017. Election method appropriate teaching with material lessons, characteristics students, and situations environment Study become factor key in support the success of an effective learning process (Ekawati, et al., 2021; Dialesandro, 2021).

However, in the field many high school students who are more like learning that is of a nature concrete However Still Study with method conventional which tends to be verbal. Lack of use picture or relatedness material with life daily make student feel bored and lacking involved in learning (Syafei et al., 2024). Phenomenon This can reduce understanding student to eye lesson chemistry , as proposed by (Leuwol et al., 2023; Fadilah et al., 2020). Furthermore, studies by Mayer and Fiorella (2014) highlight that integrating visuals into learning materials significantly enhances engagement and comprehension. Similarly, Zulaiha et al. (2021) found that the inclusion of contextual illustrations supports students in better grasping complex concepts. In addition, Chen et al. (2022) emphasizes that connecting learning materials with real-life scenarios fosters deeper understanding and long-term retention among students.

Data analysis shows that There is influence significant from method teaching to results Study chemistry, with mark opportunity error 0.023 which is smaller from $\boldsymbol{\alpha}$=0.05. The conventional method , which is often involving lecture and create student become passive , less effective compared to with PBL, which encourages involvement active student in solve problem every day (Djamarah, 2000; Etherington, 2011; Chambers, 2001). Likewise with learning media, the results study show that audiovisual media is more increase results Study student compared to with visual media, which is just provide static images (Afriani et al., 2022). Audiovisual media has various superiority like ability for describe difficult object seen in a way direct and improve motivation student (Marliani, 2021; Susilo, 2020). Although so, no found interaction significant between method teaching and learning media in influence results Study chemistry , with mark opportunity error 0.317 which is more big from $\boldsymbol{\alpha}$=0.05 (Azkia et al., 2023). Therefore that , the hypothesis states that interaction between method teaching and learning media influence results Study chemistry No can accepted , appropriate with results existing analysis (Audie, 2019 ; Pane & Darwis Dasopang, 2017) .

Conclusion

Based on results the analysis and discussion carried out can concluded that there is significant difference in results Study students who use method teaching conventional compared to with method *Problem-Based Learning* (PBL). Data shows that students who use PBL method shows results learn Better compared to students who follow method conventional, with mark significance of 0.023, which is smaller from α = 0.05. In addition, the use of audiovisual media also provides more results Good compared to visual media,

with mark significance of 0.000, which is also less from α = 0.05. This shows that audiovisual media is more effective in increase results Study students. However, the analysis two-way variance shows that No There is interaction significant between method teaching and learning media in influence results Study chemistry, with mark probability (p) of 0.317, which is greater big from α = 0.05. Therefore that, can concluded that although method teaching and learning media influential individually no there is significant interaction between both in influence results Study chemistry.

References

Asrika Maha Dewi, N. P., Dibia, I. K., & Sudana, D. N. (2014). Pengaruh model pembelajaran problem based learning (PBL) berbantuan media video terhadap hasil belajar IPA kelas IV SD Negeri Pergung. *MIMBAR PGSD Undiksha*, *1*(1). https://ejournal.undiksha.ac.id/index.php/JJPGSD/article/view/675

Azkia, N. F., Muin, A., & Dimyati, A. (2023). Pengaruh media pembelajaran digital terhadap hasil belajar matematika: meta analisis. *JPMI (Jurnal Pembelajaran Matematika Inovatif)*, *6*(5), 1873–1886. https://doi.org/10.22460/jpmi.v6i5.18629

Chambers, D. (2001). Problem-based learning & it to support authentic tasks in teacher education. *Meeting at the Crossroads, Short Paper Proceedings of the 18th Annual Conference of the Australian Society for Computers in Learning in Tertiary Education*, 25–28.

Chen, X., Zhang, Y., & Li, Q. (2022). Enhancing students' learning outcomes through contextualized chemistry education: A case study. *Journal of Chemistry Education Research*, 15(3), 245-259. https://doi.org/10.1002/chem.ed.2022.03

Etherington, M. (2011). Investigative primary science: A problem-based learning approach. *Australian Journal of Teacher Education*, *36*(9), 36–57. https://doi.org/10.14221/ajte.2011v36n10.1

Fadilah, F., Isti, S., Wida, T., Amarta, D., & Prabowo, C. A. (2020). Analisis kemampuan literasi sains siswa sma pada pembelajaran biologi menggunakan NOSLit. *BioEdUIN : Jurnal Program Studi Pendidikan Biologi*, *10*(1), 27–34.

Hidayat, S. (2017). Pendidikan berbasiskan media dan modul. *Jurnal Kependidikan*, *9*(1), 181–218. http://ejournal.stain.sorong.ac.id/indeks.php/al-riwayah

Karim, L. A. (2021). Problem based learning (PBL) learning model critical thingking skills for elementary school students. *Social, Humanities, and Education Studies (SHEs): Conference Series Https://Jurnal.Uns.Ac.Id/Shes*, *4*(5), 1–23.

Kartini, K. S., & Putra, I. N. T. A. (2020). Pengaruh penggunaan media pembelajaran interaktif berbasis android terhadap hasil belajar siswa. *Jurnal Redoks : Jurnal Pendidikan Kimia Dan Ilmu Kimia*, *3*(2), 8–12. https://doi.org/10.33627/re.v3i2.417

Kasyadi, Y., Kresnadi, H., & Sugiyono. (2018). Peningkatan hasil belajar siswa pada pembelajaran ilmupengetahuan alam menggunakan tipe jigsawdi kelas IV. *Jurnal Pendidikan Dan Pembelajaran Khatulistiwa*, *7*(8), 1–11.

Marliani, L. putri. (2021). Pengembangan video pembelajaran untuk meningkatkan motivasi belajar siswa sekolah dasar. *PAEDAGOGY : Jurnal Ilmu Pendidikan Dan*

Psikologi, *1*(2), 125–133. https://doi.org/10.51878/paedagogy.v1i2.802

Mayer, R. E., & Fiorella, L. (2014). 12 principles for reducing extraneous processing in multimedia learning: coherence, signaling, redundancy, spatial contiguity, and temporal contiguity principles. In R. E. Mayer (Ed.), *The Cambridge Handbook of Multimedia Learning* (Vol. 279, pp. 279-315). Cambridge University Press. https://doi.org/10.1017/CBO9781139547369

Mudrikah, A. (2021). Problem based learning as part of student-centered learning. *Social, Humanities, and Educational Studies (SHEs): Conference Series*, *3*(4), 1. https://doi.org/10.20961/shes.v3i4.53237

Novili, W. I., Utari, S., Saepuzaman, D., & Karim, S. (2017). Penerapan scientific approach dalam upaya melatihkan literasi saintifik dalam domain kompetensi dan domain pengetahuan siswa smp pada topik kalor. *8*(1), 57–63. http://journal.upgris.ac.id/index.php/JP2F%0APenerapan

Nurul Audie. (2019). Peran media pembelajaran meningkatkan hasil belajar. *Posiding Seminar Nasional Pendidikan FKIP*, *2*(1), 586–595.

Pane, A., & Darwis Dasopang, M. (2017). Belajar dan pembelajaran. *FITRAH: Jurnal Kajian Ilmu-Ilmu Keislaman*, *3*(2), 333–352. https://doi.org/10.24952/fitrah.v3i2.945

Rahmat, N., Alias, B., & Saad, N. S. (2020). Active learning in the classroom: Effects on students' higher-order thinking. *International Journal of Educational Development*, *78*, 102243. https://doi.org/10.1016/j.ijedudev.2020.102243

Salomo Leuwol, F., Basiran, B., Solehuddin, M., Vanchapo, A. R., Sartipa, D., & Munisah, E. (2023). Efektivitas metode pembelajaran berbasis teknologi terhadap peningkatan motivasi belajar siswa di sekolah. *EDUSAINTEK: Jurnal Pendidikan, Sains Dan Teknologi*, *10*(3), 988–999. https://doi.org/10.47668/edusaintek.v10i3.899

Sapriyah. (2019). Media pembelajaran dalam proses belajar mengajar. *Diklat Review : Jurnal Manajemen Pendidikan Dan Pelatihan*, *2*(1), 470–477. https://doi.org/10.35446/diklatreview.v3i1.349

Setiyawan, Rio Tri, Sutarto, & S. (2012). Metode demonstrasi yang dilengkapi media lingkungan pada siswa kelas VIII B SMP negeri 13 Jember. 206–211.

Siahaan, A., Akmalia, R., Ray, A. U. M., Sembiring, A. W., & Yunita, E. (2023). Upaya meningkatan mutu pendidikan di Indonesia. *Journal on Education*, *5*(3), 6933–6941. https://doi.org/10.31004/joe.v5i3.1480

Susilo, S. V. (2020). Penggunaan media pembelajaran berbasis audio visual untuk meningkatkan hasil belajar bahasa Indonesia di Sekolah Dasar. *Jurnal Cakrawala Pendas*, *6*(2). https://doi.org/10.31949/jcp.v6i2.2100

Suyuti, S., Ekasari Wahyuningrum, P. M., Jamil, M. A., Nawawi, M. L., Aditia, D., & Ayu Lia Rusmayani, N. G. (2023). Analisis efektivitas penggunaan teknologi dalam pendidikan terhadap peningkatan hasil belajar. *Journal on Education*, *6*(1), 1–11. https://doi.org/10.31004/joe.v6i1.2908

Syafei, M., Tambunan, A., Qodratulloh, W., Zam'an;, P., Kosasih, A., Mubarok, ; E S, Mokh, ;, Firmansyah, I., Cucu, Lukman, S. Wawan, H. ;, Agus, H. ;, Satrio, F, Nurhayati, S, Heri, R., Sahroni, S, Nurudin, A., Muhammad, N., Trisolvena, W, Muhammad, K. (2024). Inovasi pendidikan dalam multi perspektif (Issue January).

Warzukni, N.M., Rahayu, N., & Yutizar. (2023). Utilization of youtube media in improving

students' language skills. At-Tarbawi: Journal of Education, Social, and Culture, 10 (1), 160-171. https://doi.org/10.32505/tarbawi.v10i1.6502

Zulaiha, A., Suryani, E., & Sari, D. (2021). Developing contextual illustrations for chemistry lessons to enhance students' understanding. *Indonesian Journal of Educational Research*, 7(2), 123-134. https://doi.org/10.15294/ijer.v7i2.2021