Journal homepage: http://jurnal.uinsu.ac.id/index.php/analytica

Journal Analytica Islamica

THE EFFECT OF ASSMBLR EDU APPLICATION USE ON HIGH SCHOOL STUDENTS' INTERESTS AND LEARNING OUTCOMES IN HYDROCARBONS

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Article Info

Article history:

Received :
Revised :
Accepted :
Available online
http://jurnal.uinsu.ac.id/index.php/analytica

E-ISSN: 2541-5263
P-ISSN: 1411-4380

ABSTRACT

This study aims to analyze the effect of using the Augmented Reality (AR)-based Assemblr Edu application on high school students' learning interest and cognitive learning outcomes in hydrocarbon material. The study used a quasi-experimental approach with a nonequivalent control group design, involving two classes selected through cluster random sampling techniques, namely the experimental class using Assemblr Edu and the control class with conventional learning. The research instruments included a multiple-choice learning outcome test and a Likert-scale learning interest questionnaire. Data analysis was carried out through normality tests, homogeneity tests, and independent t-tests. The results showed a significant difference between student learning outcomes in the experimental and control classes (Sig. 2-tailed = 0.000 < 0.05), which indicates that the use of Assemblr Edu has a positive effect on improving student learning outcomes. In addition, student learning interest in the experimental class was in the very high category with an average score of 3.56. These findings indicate that three-dimensional and interactive visualization of chemical concepts through AR can increase students' affective engagement and cognitive understanding. Thus, Assemblr Edu has the potential to be an effective, innovative learning medium for abstract chemistry material.

Keywords: *Assemblr Edu; Augmented Reality; learning interest; learning outcomes; hydrocarbons.*

1. INTRODUCTION

The development of digital technology has brought significant changes to learning practices in secondary schools, particularly in efforts to improve the quality of student learning processes and outcomes. The integration of technology in education is no longer viewed merely as a tool, but rather as a strategic component in creating meaningful, interactive, and student-centered learning (Rusman, 2011; Sugiarto, 2019). Various studies have shown that the use of technology-based learning media can increase student

motivation, interest, and conceptual understanding by providing a more visual and contextual learning experience (Arsyad, 2013; Nurrita, 2022).

However, learning practices in senior high schools (SMA), particularly in chemistry, still tend to be dominated by conventional methods such as lectures and textbooks. This situation results in relatively low student engagement and learning is perceived as an activity that requires mere memorization (Pane & Dasopang, 2017). Chemistry, particularly hydrocarbons, is abstract because it involves representations of molecular structures, chemical bonds, and microscopic transformations that are difficult to visualize directly. As a result, many students experience difficulty in developing a comprehensive conceptual understanding, which ultimately results in low interest and learning outcomes (Arifatun, 2009; Devi, 2009).

Empirically, low interest in learning is positively correlated with low student learning outcomes. Research by Prastika (2020) and Widiati et al. (2022) shows that interest in learning is a crucial determinant of academic achievement, as it serves as an internal driver that influences students' attention, engagement, and persistence in the learning process. Therefore, innovative learning media that integrate cognitive and affective aspects are urgently needed, especially for abstract science materials.

One rapidly developing innovation in education is the use of Augmented Reality (AR). AR technology enables the integration of three-dimensional virtual objects with the real environment in real time, allowing students to interact directly with visual representations of the concepts being studied (Sugiarto, 2022). In the context of chemistry learning, AR is considered effective because it can visualize molecular structures and chemical processes that cannot be directly observed, thus demonstrating abstract concepts in a concrete and immersive way (Kuit & Osman, 2021; Ciptahadi et al., 2023).

One AR application that is increasingly being used in education is Assemblr Edu. This application provides interactive 3D model-based learning content that can be accessed through students' digital devices. Several previous studies have reported that Assemblr Edu positively contributes to improving conceptual understanding and learning outcomes in various subjects, such as mathematics and science (Chairudin et al., 2023; Fitri et al., 2024). However, most of this research still focuses on elementary and junior high school contexts and emphasizes cognitive learning outcomes without simultaneously examining the dimensions of student learning interests.

Thus, there is a research gap that needs to be filled. This is the limited number of empirical studies specifically analyzing the effect of using AR-based Assemblr Edu on high school students' learning interest and learning outcomes in abstract chemistry topics, particularly hydrocarbons. Furthermore, there is still little research comparing the effectiveness of AR media with conventional learning in a systematic, quasi-experimental design in a high school context.

Based on this background, this study aims to examine the effect of using the Augmented Reality-based Assemblr Edu application on high school students' learning interest and learning outcomes in hydrocarbons. This research is expected to provide theoretical contributions to the development of AR-based learning media studies, as well as practical contributions for chemistry teachers in selecting and implementing innovative learning media that can improve the quality of chemistry learning in high schools.

2. RESEARCH METHOD

This study employed a quasi-experimental research approach with a nonequivalent control group design. This design was chosen because full subject randomization was not possible, given that the classes had been administratively established by the school. A quasi-experimental design is considered appropriate for assessing the effectiveness of a learning treatment in a real-life formal educational context, especially when full control over variables is not possible (Creswell & Creswell, 2018; Listyo Yuwanto, 2019). In this design, two different groups are compared through pretests and posttests to identify changes in learning outcomes following the treatment.

The study population was all 10th-grade high school students enrolled in chemistry classes on hydrocarbons during the academic year under study. The sample consisted of two classes with a total of 70 students, each with 35 students. The sample was selected using a cluster random sampling technique, which involves drawing samples based on existing class groups and then randomly assigning them to the experimental and control classes (Sugiyono, 2019). The experimental class received instruction using the Augmented Reality (AR)-based Assemblr Edu application, while the control class underwent conventional chemistry instruction using lectures, guided discussions, and textbooks. To minimize potential bias, both classes were taught by the same teacher, using equal teaching materials and allocated equal learning time.

The research was conducted through several systematic stages. In the initial stage, the researchers developed learning materials and research instruments, including learning outcome tests and learning interest questionnaires, and coordinated with the school. The learning implementation phase spanned four sessions on hydrocarbons. In the experimental class, students used the Assemblr Edu application to visualize the molecular structures of hydrocarbons such as alkanes, alkenes, and alkynes in the form of interactive three-dimensional models. Through the AR feature, students could directly observe, rotate, and explore the molecular objects, thus aiding their understanding of abstract concepts. In contrast, the control class conducted conventional instruction without the support of AR visualization.

The research instruments consisted of test and non-test items. The learning outcome test was structured as multiple-choice questions to measure students' cognitive aspects of hydrocarbons. This instrument has undergone validity, reliability, difficulty level, and discriminatory power tests. Test reliability was calculated using the Kuder–Richardson 20 (KR-20) formula because the instrument is dichotomous, and the test results showed that the instrument has high reliability and is suitable for use as a measurement tool for learning outcomes (Silitonga, 2014). The non-test instrument, a learning interest questionnaire, was compiled based on learning interest indicators that include aspects of attention, interest, engagement, satisfaction, and usability. The questionnaire used a four-level Likert scale to increase the sensitivity of student responses and avoid the tendency for neutral answers (Astuti et al., 2024).

Data analysis was conducted quantitatively with the aid of statistical software. Prior to hypothesis testing, learning outcome data were analyzed through prerequisite tests, including a normality test using the Shapiro–Wilk test and a homogeneity of variance test using the Levene test at a significance level of 0.05. This test was conducted to ensure that the data met the assumptions of parametric analysis (Ghozali, 2018). After the

assumptions were met, hypothesis testing was conducted using an independent samples t-test to determine differences in learning outcomes between the experimental and control classes. Meanwhile, learning interest data were analyzed descriptively quantitatively by calculating the average score and percentage of achievement for each indicator, then categorized into learning interest level criteria from low to very high.

3. RESULT AND ANALYSIS

Test Instrument

Validity Test

To calculate the validity of the test items, an Excel program was used to determine the validity of each test item. The validity test was conducted using the Pearson product-moment correlation formula between the score for each test item and the total score (excluding that test item). The calculation results were compared with r_table = 0.3388 (N = 34, α = 0.05) (Appendix 3). The criterion used was that if r_calculated > r_table, the test item was declared valid. The results of the test item validation with students showed that out of 40 test items, 27 were valid and 13 were invalid. The results of the valid test items can be seen in Table 1.

Table 1. Test Instrument Validity Test Results

Question Items	Valid Question Items
1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19, 20,21,22,23,24,25,26,27,28, 29,30,31,32,33,34,35,36,37,38,39,40	2,3,6,8,10,11,13,14,16,17,18,19,20,21,23,24,25,26, 27,28,30,31,32,34,35,36,37

Reliability

Reliability was calculated using the Kuder-Richardson 20 (KR-20) formula, as the instrument was multiple-choice with a dichotomous score (true-false). The calculation results for valid test items showed a reliability of 0.848 (Appendix 4). Based on the criteria, a reliability value above 0.80 is considered very high, thus the instrument is considered reliable and can be trusted to measure student learning outcomes.

Difficulty Level

The analysis of the item difficulty level was used to determine whether the test was categorized as easy, moderate, or difficult. A good test item is one that is neither too difficult nor too easy. From the calculation results, it can be seen that of the 27 valid test items, 5 were classified as difficult, 16 as moderate, and 6 as easy (Appendix 6). The calculation results can be seen in Table 2.

Table 2. Results of the Test Instrument Difficulty Level Test

Question Category	Question Items
Difficult	2,8,19,26,34
Medium	3,10,13,16,17,20,23,24,25,27,28,31,32,35,36,37
Easy	6,11,14,18,21

Discriminatory Power

A discriminatory power analysis was used to determine whether the test could differentiate between high-ability and low-ability students. The results of the

discriminatory power test showed that of the 27 valid items, 1 item was categorized as very good, 8 items were categorized as good, 13 items were categorized as fair, and 5 items were categorized as poor (Appendix 5). The results of the discriminatory power test can be seen in Table 3.

Table 3. Results of the Discriminatory Power Test of the Test Instrument

Question Category	Question Items
Very Good	6
Good	13,18,21,24,28,31,35,36
Fair	2,3,10,14,16,17,19,23,25,26,27,34,37
Poor	8,11,20,21,32

Non-Test Instruments

Student Learning Interest Questionnaire

The learning interest questionnaire was developed by researchers based on learning interest indicators, which cover four main aspects: attention, interest, engagement, and satisfaction. Each aspect consists of several positive and negative statements measured using a four-level Likert scale: Strongly Agree (SS) with a score of 4, Agree (S) with a score of 3, Disagree (TS) with a score of 2, and Strongly Disagree (STS) with a score of 1.

Assemblr Edu Application

In addition to the questionnaire, another non-test instrument used was the Assemblr Edu application. This application functions as an Augmented Reality (AR)-based learning medium used by students in the experimental class. Assemblr Edu was chosen because it already has comprehensive and interactive chemistry learning content, including three-dimensional (3D) models depicting the structures of hydrocarbon compounds such as alkanes, alkenes, and alkynes.

The Effect of the Assemblr edu Application on Learning Outcomes

Normality Test

Tests were conducted on pretest and posttest scores for the experimental and control classes. This normality test used the Shapiro-Wilk test, analyzed using SPSS with a significance level of 0.05. If the significance level is >0.05, the data is considered normally distributed. The results of the normality test calculations for the control and experimental classes can be seen in Table 4.

Table 4. Normality Test Results

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Class	Statistic	df	Sig.	Statistic	df	Sig.
Result	pretest control	.175	35	.008	.948	35	.096
	posttest control	.177	35	.007	.945	35	.082
	pretest experiment	.164	35	.019	.948	35	.102
	posttest experiment	.164	35	.017	.941	35	.061

a. Lilliefors Significance Correction

Decision-Making Criteria:

a) If the significance value (sig) is > 0.05, the data is normally distributed.
b) If the significance value (sig) is ≤ 0.05, the data is not normally distributed.

Based on the results of the normality test in Table 4.4, all pretest and posttest data in the experimental and control classes had significance values greater than 0.05 in the Shapiro-Wilk test. Therefore, it can be concluded that the data are normally distributed.

Homogeneity Test

Based on the normality test, the pretest and posttest data for the experimental and control classes were normally distributed. Therefore, the analysis continued by testing the homogeneity of variance using SPSS with a significance level of 0.05. After data processing, the output is displayed in Table 5.

Table 5. Homogeneity Test Results

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Result	Based on Mean	1.623	3	136	.187
	Based on Median	1.251	3	136	.294
	Based on Median and with adjusted df	1.251	3	124.167	.294
	Based on trimmed mean	1.509	3	136	.215

Decision-Making Criteria:

a) If the significance value (sig.) > 0.05, then the data is homogeneous (same variance).
b) If the significance value (sig.) ≤ 0.05, then the data is not homogeneous (different variance).

Based on Table 5, it can be seen that the significance values for all approaches (mean, median, trimmed mean) are greater than 0.05, thus concluding that the variance between groups is homogeneous. Therefore, the next test, namely the hypothesis test (t-test), can be conducted.

Hypothesis Testing (t-Test)

After the student learning outcome data in the experimental and control classes are normally distributed and homogeneous, the next step is to conduct a hypothesis test. In this hypothesis test, a t-test is used to determine whether or not the Assemblr edu application has an effect on student learning outcomes. The following are the results of the t-test conducted using SPSS.

The decision-making criteria for the t-test results are: If sig. <0.05, there is a significant difference in the average between the groups. Since the sig. 0.000 <0.05, there is a statistically significant effect on learning outcomes between the experimental and control classes. This indicates that the treatment given, namely the use of the Assemblr Edu application in this experimental class, had a significant effect on improving student learning outcomes compared to the control class that was not treated.

Based on the results of the independent t-test on the posttest data for the experimental and control classes, a significance value (2-tailed sig.) of 0.000 was obtained, which is less

than the significance level of α = 0.05. Therefore, according to the testing criteria, H0 is rejected and H1 is accepted.

This indicates a significant difference between the learning outcomes of students who used the Assemblr Edu application and those who studied using conventional methods. In other words, the use of the Assemblr Edu application significantly improved student learning outcomes in hydrocarbons.

The Effect of the Assemblr Edu Application on Learning Interest

The effect of using the Assemblr Edu application on students' affective aspects was measured using a non-test instrument, a learning interest questionnaire, distributed to 35 students in the experimental class after the Hydrocarbons lesson. This questionnaire consisted of 10 statements grouped into five interest dimensions. The assessment scale used was a Likert scale, with the highest score being 4 (Strongly Agree) and the lowest being 1 (Strongly Disagree). The summary of questionnaire scores indicates that the implementation of the Assemblr Edu media had a significant and positive impact on students' learning interest.

Table 7. Results of the Student Interest Questionnaire

No	Learning Interest Aspects	Statement (Questionnaire No.)	Average Aspect score	Average Percentage	Interest Categories
1	Attention	1 - 2	3.61	85.71%	Very High
2	Interest	3 - 4	3.59	82.86%	Very High
3	Engagement	5 - 6	3.51	81.43%	High
4	Satisfaction	7 - 8	3.61	84.29%	Very High
5	Usability	9 - 10	3.50	80.00%	High
	Overall Average	1 - 10	3.56	82.86%	Very High

Based on Table 7, the average total score for the student learning interest questionnaire was 3.56, categorized as Very High. This achievement is supported by the high convergence rate of positive responses ("Agree" and "Strongly Agree"), which reached 82.86% of the total responses. This finding empirically supports the theoretical basis for the use of technology in learning, which has been proven to increase student learning interest, as its more engaging interface helps reduce boredom. A detailed analysis based on the interest dimension shows that all aspects are categorized as High to Very High:

1) Attention and Satisfaction: These two dimensions received the highest average scores of 3.61. The high scores for the Attention aspect indicate that the 3D visual media implemented through Assemblr Edu successfully fulfills its primary function as a psychological stimulant, consistent with Hamalik's view in Arsyad (2013). Meanwhile, the high Satisfaction score reflects that the immersive learning experience through AR meets students' expectations and needs.
2) Interest and Engagement Aspects: The average scores for Interest (3.59) and Engagement (3.51) indicate that the Assemblr Edu app successfully stimulated students' intrinsic motivation to learn, leading them to act and behave according to their interests. High engagement occurred because students were able to easily

visualize abstract molecular structures, making the learning process more active and interactive.

3) Ease of Use Aspects: Despite having the lowest score (3.50), this aspect remained in the High category. This confirms that minor technical challenges (such as connection and loading issues identified in initial observations) did not substantially hinder students' perceptions of the app's accessibility and ease of use.

Overall, the results of this non-test instrument analysis confirm the role of the Assemblr Edu app as an effective learning media innovation in fostering students' affective domain (interest), which is ultimately expected to positively correlate with learning outcomes (cognitive domain).

Discussion

The Effect of Using the Assemblr Edu Application on Student Learning Outcomes

The results of this study indicate a significant difference between the average learning outcomes of students taught using the Assemblr Edu application and those taught using conventional methods. Based on the t-test results, the significance value was <0.05, thus concluding that the use of Assemblr Edu had a positive and significant impact on improving student learning outcomes in hydrocarbons.

The Effect of Using the Assemblr Edu Application on Student Learning Interest

The questionnaire results showed that student learning interest was in the "very high" category (82.86%) after using Assemblr Edu. This is evident from the high scores in attention, interest, engagement, and satisfaction. This high level of interest is supported by the results in each dimension of the questionnaire:

1) Attention and Satisfaction: Both had the highest average scores (3.61). The high Attention score demonstrates that the 3D visual media successfully served as an engaging psychological stimulant, consistent with Hamalik's view in Arsyad (2013).
2) Interest and Engagement: High scores (3.59 and 3.51) indicate that the application successfully stimulated students' intrinsic learning motivation. High engagement arose from the ease with which students could visualize abstract molecular structures, making the learning process more active and interactive.
3) Usability: Despite having the lowest score (3.50), this dimension remains in the High category. This confirms that minor technical challenges (such as loading issues and limited connectivity) did not substantially hinder students' perceptions of the application's ease of access and use.

4. CONCLUSION

This study shows that the use of the Augmented Reality-based Assemblr Edu application significantly improves high school students' learning outcomes and interest in hydrocarbons. Students who participated in learning supported by three-dimensional visualizations and AR-based interactions achieved better learning outcomes than

students who participated in conventional learning. These findings confirm that the use of digital learning media capable of concretely visualizing abstract concepts plays a crucial role in helping students develop deeper conceptual understanding.

In addition to impacting the cognitive domain, the use of Assemblr Edu has also proven effective in increasing student interest in learning. High levels of student attention, interest, engagement, and satisfaction during the learning process demonstrate that interactive and immersive learning experiences can create a more engaging and meaningful learning environment. This is a crucial supporting factor for successful learning, particularly in chemistry, which students have traditionally perceived as difficult and abstract.

Practically, the results of this study provide implications for teachers and schools to consider the use of Augmented Reality-based learning media as an innovative alternative in chemistry teaching. Integrating Assemblr Edu into the learning process can be an effective strategy for improving learning quality, provided it is supported by device readiness, teacher digital literacy, and systematic lesson planning.

However, this study is limited by the sample size and the relatively short duration of the learning media implementation. Future research is recommended to involve a wider sample size, use different chemical materials, and examine the long-term impact of AR use. Furthermore, more comprehensive measurement of learning outcomes, including an analysis of the effectiveness and sustainability of AR technology use in the classroom, is an important agenda for future research development.

References

Afradisca, E., & Desnita. (2019). Development Of Learning Media In Circular Motion For Senior High School Using ICT Based On Contextual Learning. Journal Of Physics: Conference Series, 1185(1). Https://Doi.Org/10.1088/1742-6596/1185/1/012122

Arifatun. (2009). Kimia: Mengkaji Fenomena Alam Untuk Kelas X SMA/MA. Pusat Perbukuan, Departemen Pendidian Nasioal.

Arsyad, A. (2013). Manfaat Media Pembelajaran. Media Pembelajaran. In Raja Grafindo Persada (Vol. 1). Rajawali Press.

Astuti, N. D., Hapsan, A., Herianto, Mutmainna, Warsyidah, A. A., Riskawati, Mahmud, N., Febriana, B. W., & Toron, V. B. (2024). Prinsip-Prinsip Pengukuran Dan Evaluasi Pendidikan: Disertai Dengan Contoh Kasus (E. Istiyono & Widihastuti (Eds.)). CV. Ruang Tentor.

Chairudin, M., Nurhanifah, N., Yustianingsih, T., Aidah, Z., Atoillah, A., & Sofian Hadi, M. (2023). Studi Literatur Pemanfaatan Aplikasi ASSEMBLR EDU Sebagai Media Pembelajaran Matematika Jenjang SMP/MTS. Communnity Development Journal, 4(2), 1312–1318. Https://Id.Edu.Assemblrworld.Com/

Ciptahadi, K. G. O., Prasasta, I. B. G., Kusuma, T. M., Suwirmayanti, N. L. G. P., & Hadi, R. (2023). Augmented Reality Pengenalan Senyawa Kimia Untuk Siswa Sman 1 Semarapura Berbasis Android. Naratif : Jurnal Nasional Riset, Aplikasi Dan Teknik Informatika, 5(2), 110–120. Https://Doi.Org/10.53580/Naratif.V5i2.202

Devi, P. K. (2009). Kimia I Kelas X SMA Dan MA. Departemen Pendidikan Nasional.

Ernawati, I., & Setiawaty, D. (2021). Efektifitas Layanan Bimbingan Kelompok Dengan Teknik Psikodrama Dalam Meningkatkan Motivasi Belajar Siswa Kelas Viid Di Smp Negeri 11 Yogyakarta Tahun Ajaran 2017/2018. G-Couns: Jurnal Bimbingan Dan Konseling, 5(2), 220–225. Https://Doi.Org/10.31316/G.Couns.V5i2.1567

Fitri, R. L. Y., Hasan, M. A., & Sasmita, F. E. (2024). Efektivitasmedia Pembelajaran Assemblr Eduberbasis Augmented Reality(Ar) Dalam Pembelajaran Diferensiasi Untuk Meningkatkan Hasil Belajar Peserta Didik Pada Matapelajaran Ipas Kelas Iv Di Misthoriqussalam Sidoarjo. Pendas : Jurnal Ilmiah Pendidikan Dasar, 9(3), 2548–6950. Https://Doi.Org/Https://Doi.Org/10.23969/Jp.V9i3.17269

Khamidinal. (2009). Kimia SMA/MA Kelas X. Pusat Perbukua Departemen Pendidikan Nsional.

Kuit, V. K., & Osman, K. (2021). Chembond3d E-Module Effectiveness In Enhancing Students' Knowledge Of Chemical Bonding Concept And Visual-Spatial Skills. European Journal Of Science And Mathematics Education, 9(4), 252–264. Https://Doi.Org/10.30935/SCIMATH/11263

Lathifah, M., & Arifin, R. W. (2019). Animasi Interaktif Pengenalan Alat-Alat Praktikum Untuk Siswa Kelas X Kimia Analis Pada SMKN 5 Kota Bekasi. Information System For Educators And Professionals, 3(2), 189–200.

Latifah, U. N., & Suprihatiningrum, J. (2024). The Effect Of Inquiry-Based Learning On Students' Critical Thinking Ability And Activeness In Reaction Rate Material. Lectura : Jurnal Pendidikan, 15(1), 95–106. Https://Doi.Org/10.31849/Lectura.V15i1.17368

Listyo Yuwanto. (2019). Pengantar Metode Penelitian Eksperimen.

Masrek , M. N. ., Baharuddin , M. F. ., & Syam , A. M. . (2025). Determinants of Behavioral Intention to Use Generative AI: The Role of Trust, Personal Innovativeness, and UTAUT II Factors. International Journal of Basic and Applied Sciences, 14(4), 378-390. https://doi.org/10.14419/44tk8615

Nasution, M. D., & Prastika, C. (2020). Upaya Meningkatkan Hasil Belajar Siswa Melalui Model Pembelajaran Kooperatif Make-A Match (Mam) Pada Materi Limit Fungsi Di Kelas XI MAN 1 Medan. Jurnal Penelitian, Pendidikan Dan Pengajaran, 1(1), 8–15. Https://Doi.Org/Https://Doi.Org/10.30596/Jppp.V1i1.3059

Nurjanna, S. (2020). Penasehat : Sekretaris Daerah Provinsi Kalimantan Barat. Jurnal Borneo Akcaya, 6(2), 103–110.

Nurrita, T. (2022). Sarana Pembelajaran Untuk Meningkatkan Hasil Belajar. ACADEMIA: Jurnal Inovasi Riset Akademik, 2(3), 119–127. Https://Doi.Org/10.51878/Academia.V2i3.1447

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

Prastika, Y. D. (2020). Pengaruh Minat Belajar Siswa Terhadap Hasil Belajar Matematika Siswa SMK Yadika Bandar Lampung. Jurnal Ilmiah Matematika Realistik, 1(2), 17–22.

Rusman. (2011). Model-Model Pembelajaran: Mengembangkan Profesionalisme. Rajawali Pers/PT Raja Grafindo Persada.

Sayekti, R., Batubara, A. K., Aditya, M., Purwaningtyas, F., & Syam, A. M. (2021). When the" Library as Place" Matters: A Case Study of an Academic Library. Library Philosophy & Practice.

Silitonga, P. M. (2014). Statistik Teori Dan Aplikasi Dalam Penelitian. FMIPA UNIMED.

Sugiarto, A. (2019). Teknologi Dan Inovasi Dalam Pendidikan. Gramedia.

Sugiarto, A. (2022). Penggunaan Media Augmented Reality Assemblr Edu Untuk Meningkatkan Pemahaman Konsep Peredaran Darah. Madaris: Jurnal Guru Inovatif, 1(2), 1–13. Https://Doi.Org/Https://Jurnalmadaris.Org/Index.Php/Md/Article/View/2

Siregar, N.Z & Syam, A.M. (2024). The Influence of Digital Library Service Quality On Student Satisfaction. PERSPEKTIF: Journal of Social and Library Science 2 (2), 40-48.

Tanto, O. D., Mutmainah, S., Hilmiah, A. S., Nurhasanah, Prasetya, F. B., & Amrullah, J. D. R. (2025). Inovasi Pembelajaran: Pendekatan Bermain, Sejarah, Sains, Dan Teknologi Digital. Edupedia Publisher.

Ummah, M. S. A., Purba, S., Fitri, R., Genua, V., Herlina, E. S., Wijayanto, P. A., Ma'sum, H., Ndakularak, I. L., Astridewi, S., Sele, Y., Nurmala, I., Mustakim, Waworuntu, A., Sukwika, T., Darmada, I. M., & Pratasik, S. (2023). MEDIA PEMBELAJARAN ERA DIGITAL. CV. ISTANA AGENCY. Http://Repository.Um.Ac.Id/Id/Eprint/3007

Utami, B. (2009). Kimia Untuk SMA /MA Kelas I. CV. Haka MJ.

Widiati, Sridana, N., Kurniati, N., & Amrullah, A. (2022). Pengaruh Minat Belajar Dan Kebiasaan Belajar Terhadap Prestasi Belajar Matematika. Griya Journal Of Mathematics Education And Application, 2(4), 885–892. Https://Doi.Org/10.29303/Griya.V2i4.240

Yogi Fernando, Popi Andriani, & Hidayani Syam. (2024). Pentingnya Motivasi Belajar Dalam Meningkatkan Hasil Belajar Siswa. ALFIHRIS : Jurnal Inspirasi Pendidikan, 2(3), 61–68. Https://Doi.Org/10.59246/Alfihris.V2i3.843

Yohamintin. (2023). Buku Ajar Etika Profesi Guru. INDONESIA EMAS GROUP.