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THE EFFECT OF THE ULOS LEARNING MODEL ON CRITICAL THINKING SKILLS OF GRADE XI SMA NEGERI 2 PEMATANGSIANTAR IN THE 2025/2026 ACADEMIC YEAR

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Abstract

This study aims to investigate the effect of the ULOS learning model on the critical thinking skills of eleventh-grade students at SMA Negeri 2 Pematangsiantar in the 2025/2026 academic year. The ULOS learning model, which stands for Use the Essential Question, Let's Design Project and Do It, Observe Result Project and Discussion, Summarize and Reflect, is a project-based learning approach grounded in constructivist theory and integrated with local cultural values. This model encourages students to develop critical thinking and creativity through contextual problem-solving and collaborative learning experiences. The research employed a quantitative quasi-experimental design with a Pretest-Posttest Control Group Design. The population consisted of all eleventh-grade science students, and two classes were selected as samples using a simple random sampling technique. The experimental class was taught using the ULOS learning model, while the control class received conventional instruction. Data were collected using essay tests designed to measure five indicators of critical thinking skills—providing simple explanations, building basic skills, drawing conclusions, providing further explanations, and setting strategies and tactics. The collected data were analyzed using normality, homogeneity, and independent sample t-tests. The findings revealed a significant difference between the experimental and control groups, indicating that the ULOS learning model had a positive effect on students' critical thinking skills in physics learning. The implementation of ULOS created an active, collaborative, and culturally meaningful learning environment that enhanced students' analytical and reflective abilities. The study concludes that the ULOS learning model is an effective pedagogical approach for improving students' critical thinking skills and promoting culturally responsive education within the framework of the Merdeka Curriculum. The results suggest that teachers should adopt innovative, student-centered learning models such as ULOS to foster higher-order thinking and cultural awareness in science education.

Keywords: ***ULOS learning model, critical thinking skills, project-based learning, constructivism, physics education***

INTRODUCTION

Critical thinking is a high-level thinking skill that is crucial for facing the challenges of modern life. According to Nurul (2022), critical thinking is a person's ability to make, evaluate, and implement decisions based on rational and logical considerations. Individuals who are able to think systematically when receiving information and solving problems demonstrate good critical thinking skills. In the era of the Industrial Revolution 4.0, which is now transforming into Society 5.0, technological advances have a significant impact on the world of education, including in Indonesia. Japan, as a pioneering country in Society 5.0, believes that technological progress must be balanced with strengthening humanitarian aspects so that educational development remains human-centered (Maharani, 2024). Therefore, the Indonesian education system is required to adapt to increasingly rapid technological developments by implementing learning models and media that can foster students' critical thinking skills. Society 5.0 is a new era that places technology at the center of human life, while remaining oriented toward humanitarian values. This concept emerged as a refinement of the Industrial Revolution 4.0, which was deemed to place too much emphasis on the role of machines and automation (Erni Suryati Pihung & Ni Nyoman Padmawati, 2022). In the educational context, the Society 5.0 era demands that students possess various 21st-century

competencies such as digital literacy, communication skills, emotional intelligence, entrepreneurship, and problem-solving skills (Maharani, 2024). Critical thinking skills are one of the fundamental abilities needed for students to analyze information, draw conclusions, and make decisions based on valid evidence. According to Sarifah (2023), critical thinking indicators encompass five aspects: providing simple explanations, building basic skills, drawing conclusions, providing further explanations, and developing strategies and tactics. Teachers play a crucial role in fostering these skills through the application of appropriate and innovative learning models. One of the government's efforts to improve students' critical thinking skills is through the National Literacy Movement. Literacy encompasses the ability to read, write, speak, calculate, and solve problems according to an individual's competency level. Literacy also relates to the extent to which a person is able to understand and utilize information in real-life contexts. According to Susilowati (2023), the literacy movement in schools aims to foster reading habits and improve students' critical thinking skills. Through ongoing literacy activities, students are expected to not only understand texts literally but also be able to analyze, evaluate, and connect information to form reflective and critical thinking.

The role of teachers as agents of change is crucial in implementing literacy and learning programs oriented toward developing critical thinking skills. In the context of the Independent Learning Curriculum, teachers function as facilitators, helping students discover the meaning of learning independently. Heni Mawarni (2023) emphasized that the ideal teacher is a learning architect capable of designing enjoyable, contextual, and meaningful learning activities. Monotonous learning models such as lectures and question-and-answer sessions tend to make students passive and uninterested in the material. Therefore, teachers need to employ student-centered learning strategies to actively engage them in higher-order thinking processes. In fact, observations at SMA Negeri 2 Pematangsiantar show that students' critical thinking skills are still relatively low. The average score for the Final Semester Exam (UAS) for grade XI was only 50.5, far below the completion standard. This indicates that students still struggle to analyze problems and apply physics concepts in problem-solving. Bahtiar (2022) also stated that students' critical thinking skills test results in physics learning generally fall below 60. One reason is that teaching methods tend to be conventional and do not challenge students to think critically (Sundari, 2022). Students spend more time memorizing formulas than understanding concepts and applying them to real-life situations.

The problem of low critical thinking skills is also influenced by the lack of variety in learning models used in the classroom. The dominant lecture method makes students passive, while learning processes that don't involve exploration and experimentation hinder their ability to think at a higher level. Sundari (2022) added that students often simply receive information without analyzing or reflecting, resulting in physics learning being perceived as difficult and boring. Therefore, innovations in learning models are needed that can actively engage students in thinking processes, discussions, and contextual problem-solving. One alternative that is believed to improve critical thinking skills is the application of the ULOS Learning Model, which was developed based on constructivism theory and the Project-Based Learning (PjBL) approach. The ULOS model emphasizes that knowledge is acquired through active and reflective learning experiences, where students collaborate to find solutions to given problems. Sijabat (2025) explains that this model consists of four stages: Use the Essential Question, Let's Design Project and Do It, Observe Result Project and Discussion, and Summarize and Reflect. Through these stages, students are trained to ask meaningful questions, design projects, observe results, and reflect on learning independently.

LITERATURE REVIEW

Understanding Learning and Teaching

Learning is an active process involving behavioral changes resulting from experience and interaction with the environment. According to Berutu (2025), learning is a process of behavioral change that occurs due to practice and experience, encompassing cognitive, affective, and psychomotor aspects. In the context of modern education, learning is not only interpreted as an effort to acquire knowledge, but also the development of scientific thinking skills and attitudes. Learning, according to Kaniawati (2023), is a process of interaction between students, educators, and learning resources in a specific environment. Therefore, learning and teaching are interrelated in creating meaningful learning experiences that encourage students to think critically, creatively, and reflectively.

Learning model

A learning model is a conceptual framework used by teachers to design, implement, and evaluate the learning process to effectively achieve learning objectives (Mirdad, 2020). This model serves as a systematic guideline for teachers in selecting methods, strategies, and media appropriate to student characteristics. According

to Purnomo (2022), learning models play a crucial role in creating meaningful interactions between teachers and students, helping to build a conducive learning environment, and encouraging pedagogical innovation. Selecting the right model will increase student engagement, higher-order thinking skills, and optimal learning outcomes. Therefore, learning models are a key factor in the success of the educational process.

ULOS Learning Model

The ULOS learning model is a development of the Project-Based Learning (PjBL) approach based on constructivism theory. This model emphasizes that knowledge is built through active, reflective, and collaborative learning experiences (Sijabat, 2025). The ULOS learning syntax consists of four stages: Use the Essential Question, Let's Design Project and Do It, Observe Result Project and Discussion, and Summarize and Reflect. Through these stages, students are invited to design projects based on local wisdom—such as the use of Ulos cultural motifs—that are able to integrate scientific concepts with cultural values. The results of Sijabat's (2025) research show that this model is effective in improving critical thinking skills while fostering an appreciation for local culture.

Critical Thinking Skills

Critical thinking skills are an individual's ability to analyze information, evaluate arguments, and make decisions logically and objectively. According to Fridayani (2022), critical thinking encompasses higher-level cognitive processes involving identification, reasoning, and drawing evidence-based conclusions. Fitriya (2022) also states that critical thinking is fundamental to scientific learning because it helps students understand concepts and solve complex problems. Sarifah (2023) suggests five indicators of critical thinking: providing simple explanations, building basic skills, drawing conclusions, providing advanced explanations, and organizing strategies and tactics. Developing these skills is crucial in physics learning, which demands logical analysis and the application of concepts to real-world situations.

METHOD

Types and Design of Research

This study used a quantitative approach with a quasi-experimental method. The quantitative approach was chosen because this study aims to measure the effect of implementing the ULOS Learning Model on students' critical thinking skills objectively through numerical data. According to Hardani (2020), quantitative research emphasizes hypothesis testing and measuring relationships between variables using statistical analysis. The experimental design used was a Pretest-Posttest Control Group Design, which involved two groups, namely the experimental group and the control group. Both groups were given an initial test (pretest) to determine initial abilities, then the experimental group was given treatment with the ULOS Learning Model, while the control group used conventional learning. After treatment, both groups were given a final test (posttest) to measure differences in learning outcomes and critical thinking skills.

Location and Time of Research

The research was conducted at SMA Negeri 2 Pematangsiantar, located at Jalan Patuan Anggi No. 8, Pematangsiantar City, North Sumatra Province. This location was selected purposively because the school has implemented the Independent Curriculum, which provides space for project-based learning innovation. The research was conducted in the odd semester of the 2025/2026 academic year, covering the preparation, implementation, and data analysis stages. The preparation stage included instrument development and validation, the implementation stage included pretest, treatment, and posttest activities, while the final stage consisted of analysis of the results and preparation of the research report.

Population and Research Sample

The population in this study was all 234 students of grade XI of the Mathematics and Natural Sciences program at SMA Negeri 2 Pematangsiantar in the 2025/2026 academic year, consisting of seven classes. According to Sugiyono (2023), a population is a generalization area consisting of objects or subjects that have certain qualities and characteristics determined by researchers to be studied. The sampling technique used was simple random sampling, with the consideration that each class has relatively homogeneous characteristics in terms of curriculum and learning materials. The research sample consisted of two classes, namely class XI PMIA 6 as the experimental class and class XI PMIA 2 as the control class, each consisting of 30 students.

RESULTS AND DISCUSSION

Data analysis techniques

Data analysis techniques were used after the data were collected and processed using normality tests, homogeneity tests, and hypothesis testing with t-tests. This was done to determine the improvement in students' cognitive physics learning outcomes. The pretest and posttest data for the experimental and control classes can be seen in the table below:

Table 1. Pretest and Posttest Data for the Experimental Class

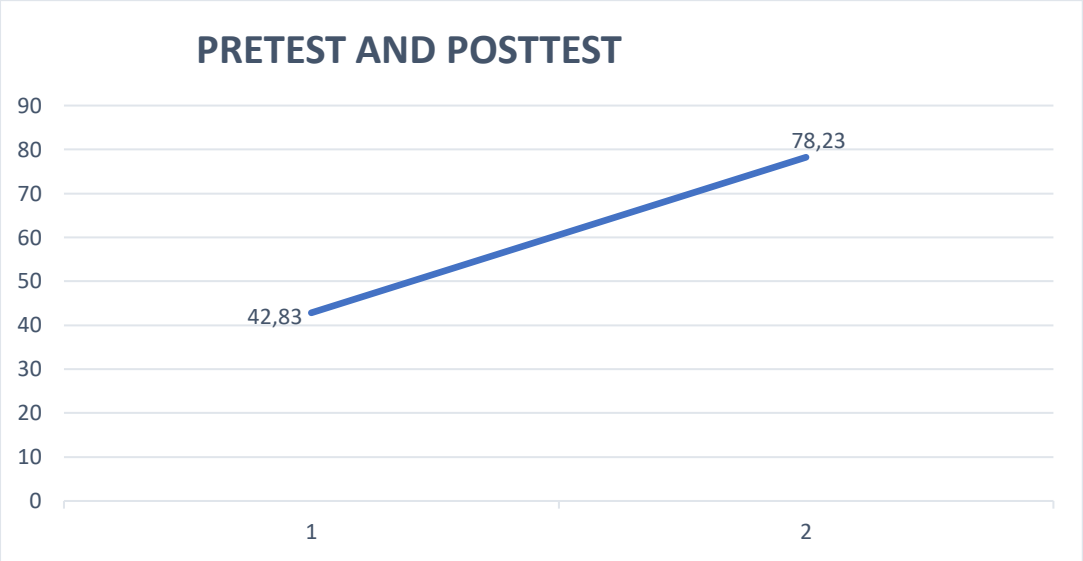

Figure 4.1. Graph of changes in pretest and posttest scores for the experimental class

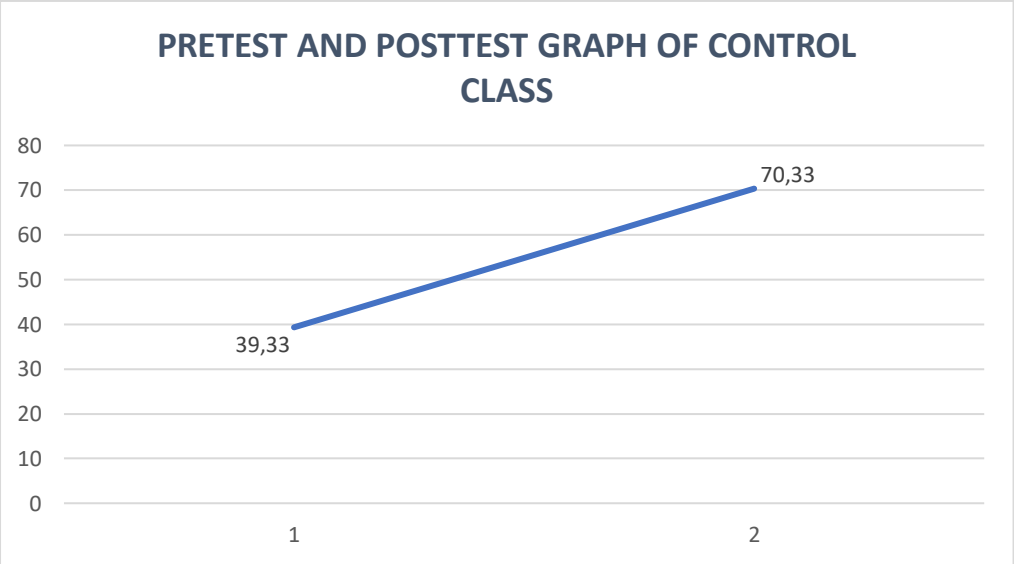

Figure 4.2. Graph of changes in pretest and posttest scores for the experimental class

Hypothesis Testing

Hypothesis testing is a temporary answer to a formulated problem, so its validity must be tested empirically. The hypothesis test in this study is the t-test.

Table 4.12 Hypothesis Testing

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Standard Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
POSTTES	Equal variances assumed	.262	.611	3,679	58	.001	7,900	2,147	3,601	12,199
	Equal variances not assumed			3,679	57,636	.001	7,900	2,147	3,601	12,199

Based on the data in the table above and based on the hypothesis test from the table above, it can be obtained that t count > t table, namely 3.679 > 1.697, so it can be concluded that Ha is accepted and H0 is rejected, so there is an influence of the ULOS learning model on students' critical thinking skills at SMA Negeri 2 Pematangsiantar.

Discussion of Research Results

The Influence of the ULOS Learning Model on Students' Critical Thinking Skills

Based on the observation results obtained from the average pretest score in the experimental class was 42.83 and the control class was 39.33. And the average posttest score in the experimental class was 78.23 and the posttest in the control class was 70.23. From the average pretest score in the control class was 39.88 and the experiment was 42.83. From this data it can be seen that the difference in the pretest scores of the experimental class and the control class was only around 3.5%. The cause of the difference in the average pretest scores in the experimental and control classes was small because the learning time or meeting was not enough considering that students learned to understand the material through a simple miniature racing arena product that they designed in their respective groups. After seeing the very low pretest score and the very small difference, the researcher used the ULOS learning model in learning in the experimental class. And after the learning was carried out, the researcher conducted a posttest in the experimental class and the control class. So that the average posttest score of the experimental class and the control class was obtained. The average score in the control class was 70.33, while the average score in the experimental class was 78.23. This data shows that the difference in pretest scores between the experimental and control classes was only 7.9%. This explanation indicates an improvement in students' critical thinking skills, based on the percentage changes in pretest and posttest results.

In the hypothesis test using the T-test, it was obtained tcount> ttable which is 3.679>1.697 then it can be concluded that Ha is accepted and H0 is rejected then there is an influence of the ULOS learning model on the critical thinking skills of class XI students of SMA Negeri 2 Pematangsiantar in the 2025/2026 academic year. This is proven and seen from the changes in the test scores of students' critical thinking skills which were tested through the posttest of the control class and the posttest of the experimental class of students after being given treatment by carrying out the ULOS learning model in the experimental class and the learning model in the control class on the GLB and GLBB material. At the time of the pretest, many students still did not understand and were confused in terms of working on questions and many students still used Google and Chat GPT as a source of answers and looked for answers from other friends, because many students still did not know the GLB and GLBB material. After implementing the ULOS learning model, students understood better and were more enthusiastic and interested in learning physics. This can be seen by researchers from the students' attitudes in responding to questions, active learning activities, and togetherness in designing a miniature racing arena for the GLB and GLBB material. By making miniature racing area products, students can more easily understand the GLB and GLBB material. This can be seen from the changes in the pretest and posttest scores of the experimental class with the syntax treatment of the ULOS learning model, namely, Use The Essential Question at this stage students are able to analyze and respond to basic questions or trigger questions given by the teacher to students. The second stage is Let's design and do it, at this stage students are invited and able to design and a miniature GLB and GLBB that can

make it easier for students to understand the learning. Observ and Result at this stage students present the results of miniature work made by their group to other friends and at this stage students are given the opportunity to ask each other questions and active learning occurs in the class. Summarize and reflect at this stage students are able to conclude the results and reflect on learning from miniatures and miniature explanations to other groups. from the steps of the learning model we can see changes in students' critical thinking skills.

We can also see the percentage of teacher assessment implementation in the experimental class, or the class given the treatment. Five votes answered "Yes" and one vote answered "No." With a percentage of "Yes" responses of 83.3% and a percentage of "No" responses of 16.6%. It can be concluded that the ULOS learning model has a positive impact and influences students' critical thinking skills. This is in line with the statement (Sijabat, 2025) The ULOS learning model facilitates students in critical thinking and a love of culture, starting with determining questions that accompany students to collaborate in finding solutions to these questions. The success of students in finding solutions will build critical thinking skills so that they find a comprehensive concept. Therefore, Physics subjects can be a vehicle for students who are able to provide self-learning based on student skills and scientific methods. Physics learning emphasizes direct experience to develop student competencies so that they are able to understand the surrounding environment through a task given to students in the form of a project in accordance with the learning that has been received at school. This is what helps students in gaining a deeper understanding and further building student skills.

This is also in line with the statement (Situmeang & Hutahaean, 2021) that language, besides being a means of communication, also provides guidance and direction to community groups as reminders, both written and spoken. Language contains traditional expressions that have values believed to be true and serve as a reference for the daily behavior of local communities. These values encompass creative intelligence, critical thinking, and knowledge of how to interact and make decisions. Umpama is a phrase worthy of attention due to its frequent use and somewhat eye-catching form. A traditional expression of the Toba Batak ethnic group, or an example often given by parents to their children, is Mata guru, roha sisean. This expression shapes the way young people of the Toba Batak ethnic group think critically and intelligently in approaching life. Critical thinking is necessary in determining an individual's life, how they act in their daily lives, and how they approach life. And the statement (Ramadani, 2025) The application of local wisdom-based teaching materials in education has great potential to improve students' critical thinking skills. In this study, the local values of the Kajang Ammatoa community, such as Pasang ri Kajang, which regulates the principles of simple living and environmental sustainability, are integrated into the learning process. Previous research shows that a local wisdom-based approach can strengthen students' scientific understanding and encourage them to think critically about the relationship between culture and science. For example, Pasang ri Kajang, which includes nature conservation and a balanced life, provides a relevant framework for teaching about ecosystems and sustainability (Saenab et al., 2024). This is also in line with research conducted by (Sijabat, 2025) The ULOS learning model is effective in increasing cultural understanding and appreciation and has the potential to be adopted and developed in various educational and cultural contexts around the world.

CONCLUSION

Based on the results of data analysis and discussion, it can be concluded that there is a positive and significant influence of the use of the ULOS learning model on the critical thinking skills of grade XI students of SMA Negeri 2 Pematangsiantar in the 2025/2026 academic year. The influence is shown through an increase in the average pretest and posttest scores in the experimental class. It can be seen through the t-test, namely tcount> ttable 3.679>1.697. And it can also be seen from the results of the implementation in improving students' critical thinking skills, it can be concluded that there is an influence of the ULOS learning model on students' critical thinking skills. This can be seen from the results of the syntax implementation sheet of the ULOS learning model of 83.3%, which is included in the very good category, which means there is an increase in students' critical thinking skills.

REFERENCES

Anggraini. (2022). Pembelajaran Statistika Menggunakan Software SPSS untuk Uji Validitas dan Reliabilitas. Jurnal Basicedu, 6(4), 6491–6504. https://doi.org/10.31004/basicedu.v6i4.3206

Bahtiar. (2022). Pengaruh Model Discovery Learning Melalui Kegiatan Praktikum IPA Terpadu Terhadap Kemampuan Berpikir Kritis Siswa. Jurnal Pendidikan Mipa, 12(2), 134–142. https://doi.org/10.37630/jpm.v12i2.564

Berutu. (2025). KONSEP DASAR DIAGNOSTIK KESULITAN BELAJAR SISWA Yohana. Pendidikan Sosial Dan Humaniora, 4(1), 195–222. https://doi.org/10.1201/9781032622408-13

Endang Tyasmaning. (2022). Model Dan Metode. In Gatut Setiadi (Ed.), Computer Physics Communications (Vol. 180, Issue 4). Institut Agama Islam Sunan Kalijogo Malang. chrome-extension://kdpelmjpfafjppnhbloffcjpeomlnpah/https://perpustakaan.iaiskjmalang.ac.id/wp-content/uploads/2023/09/66-Model-dan-Metode-Pembelajaran-1.pdf

Fitriya. (2022). Analisis Keterampilan Berfikir Kritis Siswa Sekolah Dasar Pada Pembelajaran Matematika Kurikulum 2013. JOURNAL SCIENTIFIC OF MANDALIKA (JSM) e-ISSN 2745-5955 | p-ISSN 2809-0543, 3(5), 362–366. https://doi.org/10.36312/10.36312/vol3iss5pp362-366

Fridayani. (2022). Analisis Faktor yang Memengaruhi Kemampuan Berpikir Kritis pada Mahasiswa. Journal of Business Management Education |, 7(3), 1–8.

Hardani. (2020). Buku Metode Penelitian Kualitatif. In A. Husnu Abadi, A.Md. (Ed.), Revista Brasileira de Linguística Aplicada (Vol. 5, Issue 1). CV. Pustaka Ilmu. https://doi.org/https://www.researchgate.net/publication/340021548_Buku_Metode_Penelitian_Kualitatif_Kuantitatif

Heni mawarni. (2023). Peran Guru Bahasa Indonesia Dalam Meningkatkan. JURNAL LINGUISTIK, SASTRA, DAN PENDIDIKAN, 8(2), 156–167. https://doi.org/10.51673/jurnalistrendi.v8i1.1374

Hikmah, W. K. (2020). Efektivitas Media Pembelajaran Terhadap Hasil Belajar Matematika Siswa Kelas V Sd Pertiwi Teladan Metro Pusat. 1–81.

Kaniawati. (2023). Evaluasi Media Pembelajaran. Journal of Student Research (JSR), 1(2), 18–32. https://doi.org/https://ejurnal.stie-trianandra.ac.id/index.php/jsr/article/view/954

M. Makbul. (2021). METODE PENGUMPULAN DATA DAN INSTRUMEN PENELITIAN. 2021, 1–35. file:///C:/Users/lesta/Downloads/Metode Pengumpulan Data dan Instrumen Penelitian (2).pdf

Magdalena. (2021). Analisis Validitas, Reliabilitas, Tingkat Kesulitan Dan Daya Beda Butir Soal Ujian Akhir Semester Tema 7 Kelas Iii Sdn Karet 1 Sepatan. BINTANG : Jurnal Pendidikan Dan Sains, 3(2), 198–214. https://ejournal.stitpn.ac.id/index.php/bintang

Mirdad. (2020). Model-Model Pembelajaran (Empat Rumpun Model Pembelajaran). 2(1), 14–23.

Nurhalimah. (2022). The Relationship Between Item Validity With Distinguishing Power And Difficulty Level Of Multiple Choice Questions PAS (in Indonesian). Natural Science Education Research, 4(3), 249–257. https://doi.org/https://journal.trunojoyo.ac.id/nser/article/view/8682/6502

Purnomo, A. (2022). Pengantar Model Pembelajaran (M. H. Dr. Muhamad Yahya, MA. Dr. Andrias, S.Pd.,M.Pd Dr.Irwan Abbas, S.S. (ed.)). YAYASAN HAMJAH DIHA. https://repository.radenintan.ac.id/23905/1/68. Pengantar Model Pembelajaran.pdf

Putri. (2023). Model Pembelajaran: Peningkatan Proses Pembelajaran. OSFPREPRINTS. https://doi.org/10.31219/osf.io/c9q3u

Putri Wulandari. (2024). Teknik dan Instrumen Asesmen Ranah Kognitif. BLAZE : Jurnal Bahasa Dan Sastra Dalam Pendidikan Linguistik Dan Pengembangan, 2(3), 132–145. https://doi.org/10.59841/blaze.v2i3.1513

Ramadani, I. (2025). Integrasi Bahan Ajar Berbasis Kearifan Lokal Kajang dalam Meningkatkan Keterampilan Berpikir Kritis Abstrak Jurnal Pengabdian Nasional (JPN) Indonesia. Jurnal Pengabdian Nasional (JPN) Indonesia, 6(1), 274–284.

Rindiani. (2023). PENGARUH KOMPETENSI KOMITE AUDIT DAN FINANCIAL STABILITY TERHADAP FINANCIAL STATEMENT FRAUD : Studi Pada Perusahaan Sektor Real Estate dan Properti Yang Terdaftar di Bursa Efek Indonesia Tahun 2018-2021. Jurnal Ilmiah UPI, 2019, 51–52.

Rosmaini. (2023). Analisis Faktor-Faktor yang Mempengaruhi Kemampuan Berpikir Kritis dalam Pembelajaran Matematika. Edukatif : Jurnal Ilmu Pendidikan, 5(2), 869–879. https://doi.org/10.31004/edukatif.v5i2.4767

Sarifah. (2023). Implementasi model pembelajaran inkuiri terbimbing untuk meningkatkan keterampilan berpikir kritis dan kolaborasi. Pensa E-Jurnal Pendidikan Sains, 11(1), 22–31. https://doi.org/https://ejournal.unesa.ac.id/index.php/pensa/article/view/46474

Sartika. (2022). Belajar Dan Pembelajaran (M. P. M.Tanzil Multazam,S.H,.M.Kn Mahardika Darmawan Kusuma Wardana (ed.)). UMSIDA PRESS. https://doi.org/https://press.umsida.ac.id/index.php/umsidapress/article/view/1315

Setyawan Dodiet Aditya. (2021). Buku Petunjuk Praktikum-Uji Normalitas dan Homogenitas Data dengan SPSS. In PENERBIT TAHTA MEDIA (Grup Penerbitan CV TAHTA MEDIA GROUP) (Issue July). https://www.researchgate.net/publication/350480720

Sijabat, A. (2025). Development of ULOS Learning Model with AR to Foster Cultural Appreciation. APTISI Transactions on Technopreneurship, 7(1), 72-83-72–83. https://doi.org/10.34306/att.v7i1.471

Situmeang, D. M., & Hutahaean, A. N. permata sari. (2021). Mata Guru Roha Sisean: Berpikir Kritis dalam Mengambil Keputusan Berdasarkan Ungkapan Batak Toba dan Kristiani. Journal of Education, Humaniora and Social Sciences (JEHSS), 4(1), 239–246. https://doi.org/10.34007/jehss.v4i1.557

Sofwatillah. (2024). Teknik Analisis Data Kuantitatif dan Kualitatif dalam Penelitian Ilmiah. Journal Genta Mulia, 15(2), 79–91. https://doi.org/https://ejournal.uncm.ac.id/index.php/gm/article/view/1147

Sugiyono. (2023). METODE PENELITIAN Kuantitatif,Kualitatif,dan R&D. In Sustainability (Switzerland) (Vol. 11, Issue 1).

Sundari. (2022). Android-Based Digital Teaching Materials as Online Learning in New Normal Era to Improve Physics HOTS for High School Students. Journal of Natural Science and Integration, 5(1), 149–161. https://doi.org/10.24014/jnsi.v5i1.15468

Yam, J. H. (2021). Hipotesis Penelitian Kuantitatif. Perspektif: Jurnal Ilmu Administrasi. Perspektif : Jurnal Ilmu Administrasi, 3(2), 96–102. https://doi.org/https://ejournal.unis.ac.id/index.php/perspektif/article/view/1540