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The Effect of Deep Learning Approach Assisted by Quizizz on Students' Learning Achievement in Hydrocarbon Topics

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Abstract
Low student learning outcomes regarding the topic of hydrocarbons stem from the abstract nature of the concepts and a learning process still dominated by the lecture method. This study aimed to determine the effect of a Deep Learning approach supported by Quizizz media on student learning outcomes regarding hydrocarbons at MAN Dairi. The study employed a quantitative approach using a quasi-experimental design specifically, a pretest-posttest control group design. The sample consisted of 62 students divided into an experimental group 31 students and a control group 31 students, selected via random cluster sampling. The experimental group was taught using the Deep Learning approach supported by Quizizz, while the control group was taught using Direct Instruction. The research instrument was a 20-item learning achievement test that met validity and reliability criteria. Data were analyzed using the N-Gain test, normality test, homogeneity test, and hypothesis testing via the t-test. The results showed that the average N-Gain was 0.79 for the experimental group and 0.73 for the control group; both fell into the high category. However, the improvement in student learning outcomes in the experimental group was statistically higher than in the control group. The t-test results indicated a significance value of Sig < 0.05, confirming a significant difference between the two groups. Based on these findings, it can be concluded that the Deep Learning approach supported by Quizizz media has a significant effect on improving student learning outcomes regarding hydrocarbons at MAN Dairi.

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INTRODUCTION

Education plays a crucial role in enhancing the quality of human resources in the era of technological advancement. In chemistry education, the use of appropriate teaching approaches and media is essential for improving student learning outcomes. However, chemistry is often perceived as difficult due to its numerous abstract concepts, particularly regarding hydrocarbons. The broad scope of concepts involved in this topic often results in low student achievement, with many failing to meet the established learning objective mastery criteria (Kurniawati et al., 2023; Rico et al., 2021). Furthermore, teacher-centered instructional methods have proven ineffective in fostering active student participation in the learning process (Yanti et al., 2020).

The meaningful learning theory proposed by David Paul Ausubel emphasizes that learning is more effective when students are able to connect new knowledge with their existing knowledge. In this theory, the learning process focuses not only on the reception of information but also on how students process and comprehend that information, thereby making the learning experience more meaningful (Kusuma et al., 2025). This concept of meaningful learning aligns with the Deep Learning approach, which emphasizes active student engagement in developing a profound understanding of concepts.

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The Deep Learning approach serves as a viable alternative for enhancing student learning outcomes, as it emphasizes learning that is mindful, meaningful, and joyful, thereby encouraging students to take an active role in grasping concepts (Jiang, 2022). This approach encompasses specific learning stages: understanding, applying, and reflecting. The understanding stage focuses on comprehending concepts deeply and contextually, rather than relying on rote memorization. The application stage enables students to utilize their knowledge in real-world situations through meaningful and engaging activities, such as experiments or discussions. Finally, the reflection stage emphasizes the students' ability to consciously evaluate their learning processes, thereby fostering metacognitive awareness (Sari & Arta, 2025).

Instructional media are tools used in the teaching and learning process to convey educational messages and information. Such media can stimulate students' thoughts, feelings, attention, and skills, thereby making the learning process more effective, engaging, and meaningful. Consequently, the selection and utilization of appropriate instructional media are essential for creating effective learning experiences aimed at improving learning outcomes (Ramadani et al., 2023).

Previous research indicates that the Deep Learning approach can enhance students' conceptual understanding and learning outcomes (Kholisah et al., 2025). Furthermore, the use of Quizizz has proven effective in improving student learning outcomes by fostering a more interactive and engaging learning environment (Lubis, 2022). At MAN Dairi, chemistry instruction remains dominated by the lecture method, and the use of instructional media has not been optimally implemented. During the odd semester of the 2024/2025 academic year, a significant number of students scored below the minimum mastery standard (KKTP) in chemistry. Implementing the Deep Learning approach supported by Quizizz is expected to boost student engagement, facilitate the understanding of hydrocarbon concepts, and improve learning outcomes through a more interactive and effective chemistry learning process.

Most previous studies have primarily highlighted the impact of the Deep Learning approach on students' motivation or learning outcomes in general, without incorporating the use of Quizizz. Conversely, research utilizing Quizizz has generally focused on its application alongside other learning models rather than its integration with the Deep Learning approach.

METHOD

This study employs a quantitative approach with a quasi-experimental design specifically, a pretest-posttest control group design involving both an experimental class and a control class. The study population consists of all Grade XI Science students at MAN Dairi, distributed across three classes. The sample was selected using random cluster sampling, resulting in Class XI Science 1 serving as the experimental class and Class XI Science 3 as the control class, with 31 students in each. The experimental class received instruction using the Deep Learning approach supported by Quizizz media, while the control class was taught using the Direct Instruction model.

The study began with a pretest, followed by the implementation of instruction based on the specific treatment for each class, and concluded with a posttest. The research instruments consisted of a learning motivation questionnaire and a learning achievement test, both of which had met validity and reliability requirements. Data were analyzed using the N-Gain test to determine the improvement in learning outcomes categorized as low (<0.30), medium (0.30-0.69), or high (≥0.70) followed by normality and homogeneity tests as prerequisite analyses. Hypothesis testing was conducted using a t-test at a significance level of 0.05.

RESULTS AND DISCUSSION

Result

A comparison of the average student learning outcomes in the experimental and control classes, based on the instructional treatments administered, is shown in Figure 1.

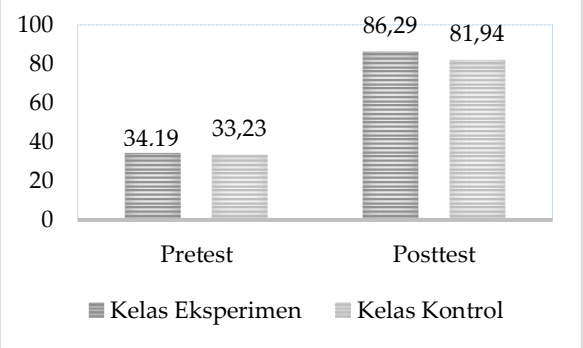


Figure 1. Average Learning Outcomes

A comparison of the average pretest and posttest scores between the experimental and control classes reveals that, prior to the intervention, the average pretest scores for both groups were relatively similar: 34.19 for the experimental class and 33.23 for the control class. This indicates that the students' initial proficiency levels in both classes did not differ significantly. Following instruction, average posttest scores improved in both groups; however, the improvement was greater in the experimental class, which achieved an average of 86.29, compared to 81.94 in the control class. Consequently, the magnitude of the improvement in learning outcomes was larger in the experimental class than in the control class. These results indicate that implementing a Deep Learning approach supported by Quizizz is more effective at enhancing student learning outcomes regarding hydrocarbon topics than using the Direct Instruction model.

Table 1. Descriptive Statistics of N-Gain

Class	N-Gain	StandardDeviation	Value Lowest	Value Highest	Category	Sig
experimental	0,79	0,09236	0,62	1,00	tall	0,780
control	0,73	0,08733	0,54	0,92	tall	0,840

Based on the N-Gain calculation results, the experimental class achieved an average of 0.79 ± 0.09, with a minimum value of 0.62 and a maximum value of 1.00. These results indicate that the improvement in student learning outcomes in the experimental class falls into the high category. Meanwhile, the control class obtained an average N-Gain of 0.73 ± 0.08, with a minimum value of 0.54 and a maximum value of 0.92. Based on N-Gain categories, the improvement in student learning outcomes in the control class also falls into the high category. However, the average N-Gain of the experimental class was higher than that of the control class. The results of the data normality tests for the experimental and control classes are presented in Table 2.

Table 2. Shapiro-Wilk Normality Test

Class	*Statistic*	*df*	Shapiro Wilk (Sig)	Note
experimental	0,979	31	0,780	Normal
control	0,981	31	0,840	Normal

Based on the results of the Shapiro–Wilk normality test, the significance values for the learning outcome N-Gain data were 0.780 for the experimental class and 0.840 for the control class. Since the significance values for both classes exceeded 0.05, the learning outcome N-Gain data for both the experimental and control classes were determined to be normally distributed. The results of the homogeneity test on student learning outcomes are presented in Table 3.

Table 3. Levene's Test for Homogeneity

	Levene statistic	df1	df2	Sig.	Note
Average	0,108	1	60	0,812	Homogen

Based on the homogeneity test results using Levene's Test, a significance value of 0.812 was obtained. This value is greater than 0.05; therefore, the variances of the data regarding the improvement in learning outcomes for the experimental and control classes are considered homogeneous.

Discussion

Based on the research findings, the average student learning outcomes in the experimental class were higher than those in the control class. These results indicate that the implementation of the Deep Learning approach assisted by Quizizz media had a positive impact on improving student learning outcomes regarding the topic of hydrocarbons. Hypothesis testing also yielded a significance value of < 0.05, indicating a significant difference in the improvement of learning outcomes between the experimental and control classes. Furthermore, N-Gain calculations showed that the improvement in learning outcomes in the experimental class was greater than that in the control class.

The greater improvement in learning outcomes observed in the experimental class occurred because the Deep Learning approach encourages students to build a deeper understanding of concepts rather than merely memorizing information. During the learning process, students are encouraged to connect new concepts with their existing knowledge, analyze problems, apply concepts to different situations, and reflect on their learning outcomes. This process renders learning more meaningful, making hydrocarbon concepts easier for students to understand and retain.The use of Quizizz further supports the effectiveness of this approach. Quizizz provides immediate feedback after students answer each question, allowing

them to quickly identify errors and correct their understanding. Furthermore, the interactive presentation of questions combined with scoring, rankings, and game-like elements enhances student engagement and motivation during the learning process. Repeated practice using Quizizz also helps reinforce students' retention of hydrocarbon concepts, thereby leading to improved learning outcomes.

The results of this study align with research by Setiawan (2026), which indicates that the Deep Learning approach enhances student engagement in the learning process, thereby helping students grasp concepts more deeply. Through this approach, students are encouraged to actively understand, connect, apply, and reflect on the concepts being studied, making the learning experience more meaningful. The findings also demonstrate that integrating the Deep Learning approach with the Quizizz platform provides a more interactive and effective learning experience for improving student learning outcomes regarding hydrocarbons.

CONCLUSION

Based on the research findings, it can be concluded that the implementation of the Deep Learning approach supported by Quizizz media at MAN Dairi had a significant impact on improving student learning outcomes regarding the topic of hydrocarbons. The average N-Gain score was 0.79 for the experimental class and 0.73 for the control class; while both fell into the high category, the experimental class demonstrated a greater improvement in learning outcomes. Hypothesis testing using the t-test yielded a significance value of less than 0.05 (Sig. < 0.05), indicating a significant difference in learning outcomes between the experimental and control classes. Thus, the Deep Learning approach supported by Quizizz media is more effective than the Direct Instruction model in enhancing student learning outcomes for the hydrocarbon topic.

RECOMMENDATION

This study has several limitations that should be considered when interpreting the results. The research was conducted at only one school MAN Dairi meaning the findings cannot yet be broadly generalized to schools or student populations with different characteristics. The study involved only two sample classes (one experimental and one control), resulting in a limited sample scope. Furthermore, the research focused exclusively on measuring learning outcomes in the cognitive domain via achievement tests, leaving other aspects such as learning motivation, critical thinking skills, and post-instructional retention unmeasured. Consequently, further research is needed to expand the sample scope and incorporate a wider range of learning-related measurements.Based on the findings and existing limitations, it is recommended that teachers implement a Deep Learning approach supported by Quizizz as an alternative instructional method to enhance student learning outcomes, particularly for abstract topics such as hydrocarbons. Schools are encouraged to support this implementation by providing adequate facilities such as internet access and instructional devices and by offering teacher training on the use of technology-based learning media.

BIBLIOGRAPHY

Jiang, R. (2022). Understanding, Investigating, and promoting deep learning in language education: A survey on chinese college students' deep learning in the online EFL teaching context. *Frontiers in Psychology*, *13*(2), 1–18. https://doi.org/10.3389/fpsyg.2022.955565

Kholisah, T. A., Hamnah, R., Aesha, N. A., Bevan, M. P., & Suhardi. (2025). Analisis Efektivitas Implementasi Kebijakan Deep Learning di Sekolah. *Khatulistiwa: Jurnal Pendidikan Dan Sosial Humaniora*, *5*(3), 833–845. https://doi.org/10.55606/khatulistiwa.v5i3.7322

Kurniawati, Y., Mayshinta, I., & Yenti, E. (2023). Identifikasi Kesulitan Materi Kimia Bagi Siswa SMA: Kajian Literatur. *Seminar Nasional Hasil*, *1*(4), 23–27. https://www.ejournal.uniks.ac.id/index.php/ProsidingUniks/article/view/3371

Kusuma, F. D., Salsabila, J. F., Ningtyas, F. A., & Hernaeny, U. (2025). *Penerapan Pembelajaran bermakna Ausubel Dalam Materi Pertidaksamaan Kuadrat*. *3*(1), 1–11

Lubis, A. S. (2022). Penerapan Aplikasi Google Classroom, Jamboard, Google slide, Google Form dan Quizizz dalam Pembelajaran Kimia. *Jurnal Impresi Indonesia (JII)*, *1*(12), 1237–1251. https://doi.org/10.58344/jii.v1i12.739

Ramadani, A. N., Kirana, K. C., Astuti, U., & Marini, A. (2023). Pengaruh Penggunaan Media Pembelajaran Terhadap Dunia Pendidikan(Studi Literatur). *Jurnal Pendidikan Dasar Dan Sosial Humaniora*, *2*(6), 749–756.

Rico, A. E., Fitriza, Z., Kimia, P., & Padang, U. N. (2021). Deskripsi Miskonsepsi Siswa pada Materi Senyawa

Hidrokarbon : Studi Literatur. *Jurnal Ilmu Pendidikan Research*, *3*(4), 1495–1502.

Sari, A. W., & Arta, D. J. (2025). Implementasi Deep Learning : Suatu Inovasi Pendidikan. *Jurnal Wawasan Pengembangan Pendidikan*, *13*(01), 1–6.

Setiawan, F. R. (2026). Pengaruh Model Pembelajaran Berbasis Deep Learning Terhadap Motivasi Belajar Siswa Pada Mata Pelajaran Pendidikan Agama Islam Dan Budi Pekerti. *Pendidikan Agama Islam*, *9*(1), 1–10. https://doi.org/10.32528/tarlim.v9i1.4956

Yanti, R. P., Asril, A., Musdansi, D. P., Uniks, J. O. M. F. T. K., Yanti, R. P., Asril, A., & Musdansi, D. P. (2020). Pengaruh Model Pembelajaran Jigsaw pada Materi Hidrokarbon kelas XI MIPA (SMAN 1 Cerenti). *JOM FTK UNIKS*, *2*(1), 138–148.