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Implementation of the Inquiry Learning Model Assisted by Augmented Reality in Teaching the Human Digestive System to Develop Critical Thinking Skills

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Abstract
This study is motivated by the need among elementary school students for instructional models and media that foster interactive learning to enhance their critical thinking skills. In teaching the human digestive system, appropriate pedagogical models and learning media are essential to stimulate student motivation and cultivate critical thinking. This study aims to examine the extent to which the Augmented Reality (AR)-assisted inquiry learning model influences students' critical thinking skills. A quasi-experimental method with a non-equivalent control group design was employed at SDN 044 Awigombong. The findings revealed a statistically significant difference between students taught using the AR-assisted inquiry learning model and those taught using the scientific approach, as indicated by the Mann-Whitney U test ($p = 0.001$). Furthermore, the normalized gain (N-Gain) analysis demonstrated that the experimental group achieved an N-Gain score of 0.85 (high category), whereas the control group, taught using a picture-assisted scientific approach, attained an N-Gain score of 0.60 (moderate category). The calculated effect size was 1.29, indicating a substantial impact. These findings confirm that implementing the AR-assisted inquiry learning model in the experimental class exerts a strong positive effect on improving elementary students' critical thinking skills in learning the human digestive system.

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Introduction

Critical thinking is an essential competency that elementary school students need to develop to respond effectively to the complexities of contemporary life. This competency enables students to evaluate scientific phenomena, analyze information systematically, and make reasoned decisions before accepting information as valid (Manurung et al., 2023). Critical thinking also facilitates students' ability to examine and process information analytically rather than merely memorize factual knowledge (Firdausi et al., 2021). Furthermore, it encourages reflective thinking in addressing problems, evaluating alternative solutions, and making appropriate decisions (Hayati & Setiawan, 2022). Developing critical thinking skills at the elementary school level is particularly important because this educational stage provides the foundation for more complex cognitive processes. In science education, these skills enable students to construct explanations, examine evidence, and understand the relationship between scientific concepts and everyday phenomena. Therefore, elementary science instruction should provide meaningful learning experiences that systematically develop students' critical thinking skills.

Despite the importance of critical thinking, its development in elementary education continues to encounter various pedagogical challenges. Inappropriate instructional models, insufficient consideration of students' prior knowledge, limited utilization of learning media, and inadequate assessment practices contribute to difficulties in developing students' critical thinking skills (Partami et al., 2021). Conventional teacher-centered instruction may also restrict students' active participation and opportunities to construct conceptual understanding independently (Savitri & Meilana, 2022). Meanwhile, meaningful interactions between teachers and students are necessary to facilitate creativity, intellectual engagement, and critical thinking (Yani et al., 2023). Inadequate classroom management and insufficient attention to students' learning needs may further hinder their participation and learning outcomes (Inayah et al., 2023). These challenges become increasingly relevant as elementary education is expected to prepare students with competencies appropriate to the demands of the twenty-first century (Anggraeni et al., 2022). Consequently, instructional innovation is necessary to transform passive learning environments into interactive learning experiences that encourage students to investigate, analyze, and evaluate information.

The development of critical thinking skills is particularly relevant to elementary science instruction on the human digestive system. This topic requires students to understand the anatomical structures, functions, and interconnected processes of digestive organs that cannot be directly observed in everyday classroom activities. The abstract characteristics of these concepts may create difficulties for students when instructional activities rely primarily on verbal explanations and static illustrations. Previous literature has highlighted the importance of selecting appropriate instructional media for teaching the human digestive system at the elementary school level (Puspita et al., 2023). Furthermore, the challenges encountered by elementary school teachers in science instruction indicate the need for pedagogical strategies that accommodate students' learning characteristics (Zuhaida & Yustiana, 2023). Learning activities should therefore extend beyond identifying digestive organs and memorizing their functions by encouraging students to investigate relationships, formulate explanations, and draw evidence-based conclusions. Addressing these instructional challenges requires an

integration of appropriate pedagogical models and learning media that support active exploration and scientific reasoning.

Inquiry learning represents a pedagogical approach that can facilitate the development of students' critical thinking skills through systematic investigation. This model emphasizes student-centered exploration, enabling students to investigate phenomena and construct knowledge through active participation (Efendi et al., 2021). Inquiry-based activities provide opportunities for students to formulate questions, develop hypotheses, collect information, examine evidence, and draw conclusions. The application of inquiry learning has been associated with the development of critical thinking skills in elementary education (Pratiwi & Mawardi, 2020). Similarly, problem-oriented instructional approaches emphasize the importance of providing students with opportunities to construct knowledge and independently address learning problems (Inayati, 2022). The relevance of inquiry learning to the development of critical thinking and creativity among elementary school students has also been examined in previous research (Putri et al., 2023). However, the implementation of inquiry learning on abstract scientific topics requires appropriate instructional media to facilitate observation, information gathering, and evidence-based reasoning.

Augmented reality (AR) offers an opportunity to support inquiry learning by presenting abstract scientific concepts through interactive three-dimensional visualizations. This technology enables users to interact with virtual objects integrated into their physical surroundings, thereby providing a more concrete representation of learning materials (Nistrina, 2021). In elementary science education, augmented reality can facilitate students' exploration of objects and processes that are difficult to observe directly. Previous research has examined the potential of augmented reality-based instructional media to enhance elementary school students' interest in science learning (Pratiwi et al., 2024). The application of augmented reality in presenting three-dimensional learning objects also illustrates its potential to support students' understanding of abstract concepts (Sari et al., 2022). In learning about the human digestive system, augmented reality can provide visual representations that allow students to explore the structures, positions, and functions of digestive organs. Integrating these visual experiences into inquiry-based activities may encourage students not only to understand scientific concepts but also to analyze information, examine hypotheses, and formulate reasoned conclusions.

Previous studies have examined various instructional innovations designed to improve elementary school students' cognitive competencies. Research on inquiry learning has primarily addressed its relationship with critical thinking and creativity (Putri et al., 2023), as well as higher-order thinking skills (Yulisdiva et al., 2023). Other studies have explored augmented reality as an instructional medium for enhancing students' interest in science learning (Pratiwi et al., 2024). Although these studies provide a foundation for instructional innovation, the literature reviewed in this study leaves room for further empirical investigation into the integration of inquiry learning and augmented reality to develop critical thinking skills in the context of the human digestive system. In particular, further investigation is needed to examine how this integrated instructional approach supports different dimensions of students' critical thinking skills. The distinctive contribution of this study lies in integrating augmented reality into the systematic stages of inquiry learning and evaluating its effectiveness using the critical

thinking framework developed by Robert H. Ennis. This integration positions augmented reality not merely as a visualization medium but as a cognitive tool that supports scientific investigation and evidence-based reasoning.

Based on these considerations, this study aims to examine the effectiveness of an augmented reality-assisted inquiry learning model in developing fifth-grade elementary school students' critical thinking skills in learning about the human digestive system. Specifically, this study investigates differences in critical thinking skills between students taught using the augmented reality-assisted inquiry learning model and those taught using a picture-assisted scientific approach. Students' critical thinking skills are examined through five indicators proposed by Robert H. Ennis, namely elementary clarification, basic support for decision-making, inference, advanced clarification, and strategies and tactics. This study also evaluates the magnitude of improvement and the effect size associated with the instructional intervention. Theoretically, this research is expected to contribute to the understanding of technology-assisted inquiry learning in developing critical thinking skills within elementary science education. Practically, the findings are expected to provide elementary school teachers with an empirical basis for designing interactive, exploratory, and cognitively stimulating science instruction.

Method

This study employed a quantitative quasi-experimental method utilizing a non-equivalent control group design, which compares an experimental group and a control group without random assignment. The research population comprised all fifth-grade students at SDN 044 Awigombong, located in Cicadas, Bandung City, Indonesia. Using a purposive sampling technique, two classes were selected as research samples: Class V-D (n = 26; 10 females and 16 males, aged 11–12 years) was assigned as the experimental group and received instruction via the AR-assisted inquiry learning model, while Class V-E (n = 26; 14 females and 12 males, aged 11–12 years) served as the control group and was taught using a picture-assisted scientific approach. Data were collected using classroom observation sheets as well as pre-test and post-test instruments designed to measure critical thinking skills. Prior to hypothesis testing, prerequisite analyses, namely the Shapiro-Wilk normality test and homogeneity of variance test, were conducted using SPSS Statistics version 30. Because the post-test data in the control group violated the normality assumption, the non-parametric Mann-Whitney U test was utilized instead of an independent samples t-test to evaluate significant differences between the two groups. Additionally, normalized gain (N-Gain) and effect size analyses were performed to determine the magnitude of improvement and the practical impact of the intervention.

Results and Discussion

Results

The implementation of the inquiry learning model in the experimental class proceeded smoothly and aligned closely with the pre-designed lesson plan. Across the six syntax stages of inquiry learning: (1) Asking questions or posing problems: Students responded actively and interactively to the teacher's initial stimulus questions regarding the human digestive system; (2) Formulating problems: Although a few students required teacher scaffolding, the majority

successfully formulated relevant research questions using simple language; (3) Formulating hypotheses: Students generated basic hypotheses grounded in their prior knowledge; (4) Collecting data: Students enthusiastically and actively utilized the AR application to gather information; (5) Testing hypotheses: Students used the AR media to compare their findings against their initial hypotheses and subsequently presented their results; (6) Drawing conclusions: The teacher and students collaboratively synthesized the key concepts learned. Overall, 100% of the planned syntax stages in the AR-assisted inquiry learning model were successfully executed.



Figure 1. Students utilizing the Augmented Reality application during data collection.

This study focused on integrating the six stages of inquiry learning with AR media to foster students' critical thinking across the indicators defined by Robert H. Ennis within the Natural and Social Sciences (IPAS) topic of the human digestive system. Prior to the lesson, student representatives installed the AR application on their devices. The application proved highly user-friendly; students simply scanned body-shaped markers to project interactive 3D visualizations accompanied by audio explanations of human digestive organs. Students could freely rotate and inspect the 3D organ models, facilitating independent data collection to answer their inquiry worksheets.

AR media plays a pivotal role as a cognitive tool that transforms abstract concepts of the human digestive system into tangible, interactive 3D visuals. By manipulating visual representations of complex internal organs, students experienced heightened motivation and engagement. This aligns with Dual Coding Theory, which posits that combining verbal and visual information reinforces cognitive processing and knowledge retention, thereby enhancing higher-order thinking and critical thinking skills. These results corroborate prior studies demonstrating that inquiry learning sharpens critical thinking and that AR fosters meaningful learning. Furthermore, this study offers a novel contribution by synthesizing inquiry-based pedagogy with AR technology as an integrated instructional solution for elementary science education.

To evaluate the empirical impact of the intervention, pre-test and post-test assessments were administered to both the experimental and control groups. The descriptive statistics of students' critical thinking scores are presented in Table 1.

Table 1. Descriptive statistics of students' critical thinking skills in the experimental and control groups.

Group / Test Stage	N	Minimum	Maximum	Mean	Std. Deviation
Experimental Pre-test	26	33.00	70.00	45.08	8.333
Control Pre-test	26	38.00	58.00	48.54	6.754
Experimental Post-test	26	75.00	100.00	91.58	7.920
Control Post-test	26	40.00	95.00	79.38	10.771
Valid *N* (listwise)	26	—	—	—	—

As shown in Table 1, the pre-test mean score was 45.08 (SD = 8.333) in the experimental group and 48.54 (SD = 6.754) in the control group. The minimal difference between these baseline scores indicates that both groups possessed relatively equivalent initial critical thinking abilities prior to the intervention.

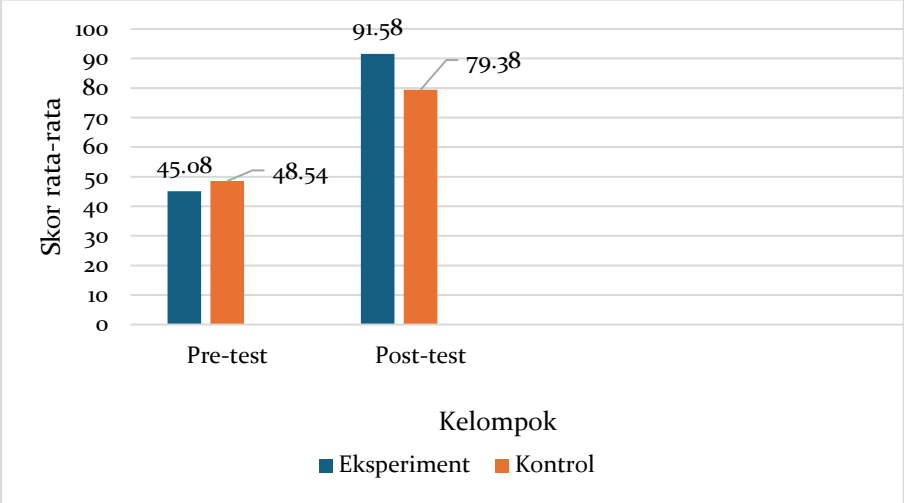

Figure 2. Comparison of mean pre-test and post-test scores between the experimental and control groups.

Following the instructional intervention, both groups exhibited increases in their mean post-test scores; however, the experimental group achieved a substantially higher mean score (M = 91.58, SD = 7.920) than the control group (M = 79.38, SD = 10.771). This confirms that the AR-assisted inquiry learning model more effectively enhances students' critical thinking skills in learning the human digestive system.

The pre-test and post-test items were constructed to evaluate five core indicators of Robert H. Ennis's critical thinking framework: *elementary clarification*, *basic support for decision-making*, *inference*, *advanced clarification*, and *strategies and tactics*. Analyzing each indicator separately provides granular insight into how each instructional treatment affected specific dimensions of critical thinking.

In the pre-test, the control group scored slightly higher than the experimental group across all five indicators: elementary clarification (Control: 53; Experimental: 48), basic support for decision-making (Control: 52; Experimental: 48), inference (Control: 50; Experimental: 44), advanced clarification (Control: 51; Experimental: 43), and strategies and tactics (Control: 36; Experimental: 35). Conversely, in the post-test, the experimental group outperformed the control group across every indicator: elementary clarification (Experimental: 98; Control: 80),

basic support for decision-making (Experimental: 91; Control: 89), inference (Experimental: 93; Control: 85), advanced clarification (Experimental: 89; Control: 85), and strategies and tactics (Experimental: 85; Control: 57). These shifts underscore the substantial pedagogical impact of the AR-assisted inquiry learning intervention.

Before conducting inferential hypothesis testing, normality and homogeneity tests were performed. Since each group had fewer than 50 participants ($n = 26$), the Shapiro-Wilk test was used to assess normality (Table 2).

Table 2. Results of prerequisite normality and homogeneity tests for pre-test and post-test data.

Data Stage	Group	N	Shapiro-Wilk Sig. (p)	Distribution	Levene's Homogeneity Sig. (p)	Variance Status
Pre-test	Experimental	26	0.084	Normal	0.697	Homogeneous
	Control	26	0.055	Normal		
Post-test	Experimental	26	0.208	Normal	0.851	Homogeneous
	Control	26	0.001	Non-normal		

As presented in Table 2, while the pre-test scores for both groups and the experimental post-test scores were normally distributed ($p > 0.05$), the control group's post-test data deviated significantly from normality ($p = 0.001 < 0.05$). Because parametric t-tests require normally distributed data, the non-parametric Mann-Whitney U test was employed to compare post-test performance between the two independent groups (Tables 3 and 4).

Table 3. Mean ranks from the Mann-Whitney U test on post-test critical thinking scores.

Outcome Variable	Group	N	Mean Rank	Sum of Ranks
Critical Thinking Skills	Experimental (Inquiry Learning & AR)	26	38.69	1006.00
	Control (Scientific Approach & Picture)	26	14.31	372.00
Total		52	—	—

Table 4. Mann-Whitney U test statistics.

Test Statistic	Critical Thinking Skills
Mann-Whitney U	21.000
Wilcoxon W	372.000
Z	-5.813
Asymp. Sig. (2-tailed)	0.001

The Mann-Whitney U test yielded $U = 21.000$, $Z = -5.813$, and $p = 0.001$ ($p < 0.05$), demonstrating a statistically significant difference in post-test critical thinking skills between students taught with AR-assisted inquiry learning (Mean Rank = 38.69) and those taught with the picture-assisted scientific approach (Mean Rank = 14.31).

To further quantify the magnitude of learning gains, an N-Gain analysis was performed (Table 5).

Table 5. Normalized gain (N-Gain) analysis for the experimental and control groups.

Group	Pre-test Mean	Post-test Mean	N-Gain Score	N-Gain (%)	Category	Effectiveness Level
Experimental	45.08	91.58	0.85	85%	High	Effective
Control	48.54	79.38	0.60	60%	Moderate	Moderately Effective

As shown in Table 5, the experimental group achieved an N-Gain score of 0.85 (85%), falling into the *high* and *effective* category, whereas the control group attained an N-Gain score of 0.60 (60%), categorized as *moderate* and *moderately effective*. This confirms that AR-assisted inquiry learning is substantially more effective in elevating students' critical thinking than conventional picture-assisted scientific instruction.

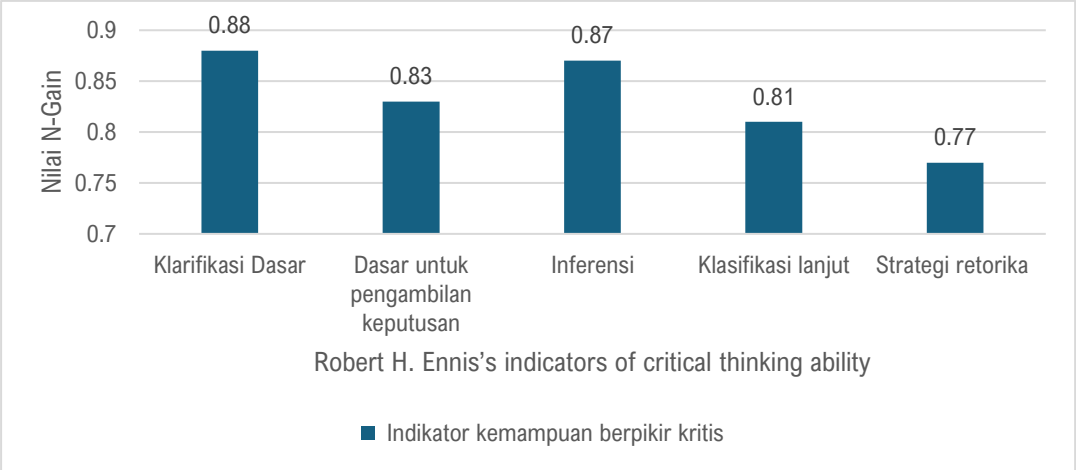

Figure 3. N-Gain scores across each critical thinking indicator in the experimental group.

In the experimental group (Figure 3), all five critical thinking indicators achieved N-Gain scores within the *high* category. The highest gain occurred in *elementary clarification* (N-Gain = 0.88), while *strategies and tactics* showed the lowest gain (N-Gain = 0.77), though it remained within the high and effective threshold.

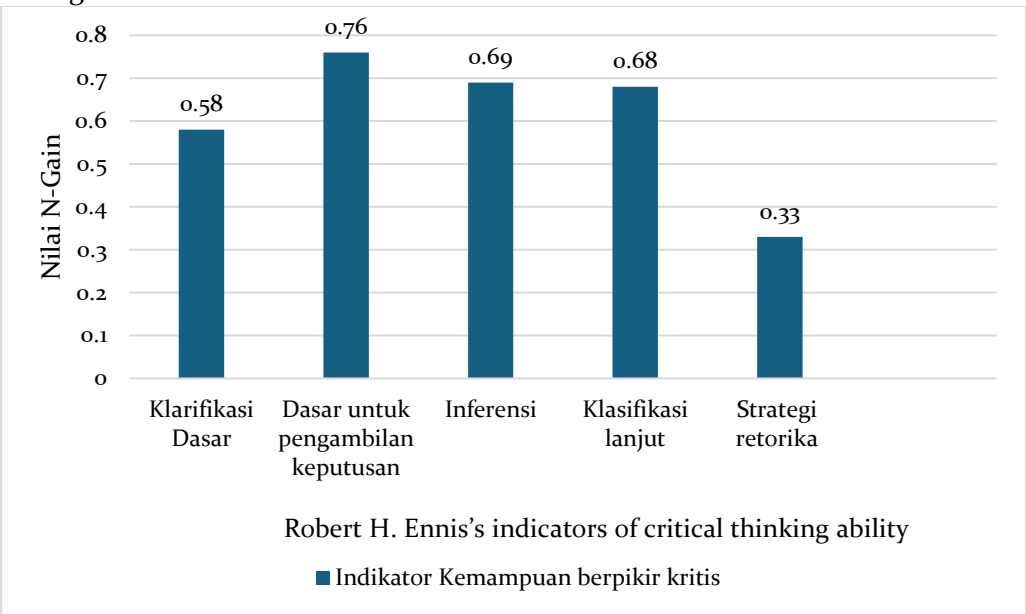

Figure 4. N-Gain scores across each critical thinking indicator in the control group.

Conversely, in the control group (Figure 4), *elementary clarification*, *inference*, and *advanced clarification* fell into the *moderate* category. Only *basic support for decision-making* reached the *high* category (N-Gain = 0.76), whereas *strategies and tactics* recorded a *low* N-

Gain score of 0.33, indicating poor effectiveness in developing students' strategic argumentation skills under traditional picture-assisted instruction.

Finally, an effect size analysis was conducted to measure the practical strength of the intervention's impact on students' critical thinking skills (Table 6).

Table 6. Effect size calculation results.

Group	Mean N-Gain	Post-test Std. Deviation	Effect Size (d)	Interpretation
Experimental	0.85	7.920	1.29	Large / High Effect
Control	0.60	10.771	—	—

The calculated effect size of 1.29 exceeds the 0.80 threshold for a large effect, demonstrating that implementing the AR-assisted inquiry learning model exerts a strong and substantial positive impact on improving elementary students' critical thinking skills in the human digestive system topic. Consequently, this pedagogical approach is highly recommended for elementary science instruction.

Discussion

The empirical findings reveal marked differences in the attainment of critical thinking indicators between the experimental and control groups. Within the experimental group, the highest N-Gain was observed in *elementary clarification* (0.88), while the lowest was in *strategies and tactics* (0.77). Similarly, in the control group, *strategies and tactics* recorded the lowest N-Gain (0.33), whereas *basic support for decision-making* achieved the highest (0.76). In the experimental class, the pronounced improvement in *elementary clarification*, which encompasses focusing on questions, analyzing arguments, and understanding fundamental concepts. It can be attributed to the synergistic effect of AR visualization and inquiry syntax. AR effectively rendered the anatomical structures, shapes, and spatial positions of human digestive organs into realistic 3D models. Combined with the initial inquiry stage of *posing questions*, students' curiosity was stimulated, enabling them to explore anatomical information concretely and independently. Conversely, *strategies and tactics*, which requires students to formulate actions, articulate logical arguments, and interact persuasively with others, yielded the lowest relative gain. Because fifth-grade students (aged 11–12) are transitioning from Piaget's concrete operational stage to formal operational thinking, constructing structured arguments and rhetorical strategies requires sustained practice and scaffolding over time. While AR media effectively supports visual-conceptual comprehension, developing advanced argumentative strategies requires prolonged pedagogical habituation (Gultom, 2025).

To evaluate the broader practical viability of implementing AR-assisted inquiry learning in elementary classrooms, a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis was conducted: The first, strengths: (1) Inquiry learning promotes active student engagement throughout the learning process; (2) AR provides realistic 3D visualizations that simplify abstract anatomical concepts; (3) the combined approach fosters Higher-Order Thinking Skills (HOTS) aligned with 21st-century educational standards; and (4) it demonstrably enhances critical thinking skills. The second, weaknesses: (1) Implementation

requires compatible mobile devices (smartphones or tablets); (2) unfamiliarity with AR applications among some teachers and students necessitates initial orientation; and (3) executing all six stages of inquiry learning thoroughly requires substantial instructional time. The third, opportunities: (1) The AR-assisted inquiry model can be adapted to other abstract elementary science topics; (2) it holds strong potential for integration into distance learning or blended learning environments; and (3) it aligns seamlessly with Indonesia's *Kurikulum Merdeka* (Emancipated Curriculum), which emphasizes exploratory learning and student creativity. The fourth, threats: (1) Reliance on digital hardware and stable internet connectivity poses infrastructural barriers; (2) teachers lacking digital literacy require targeted professional development to integrate AR effectively; and (3) disparities in technological infrastructure across elementary schools may limit equitable adoption. Overall, the statistical evidence, comprising the Mann-Whitney U test ($p = 0.001$), high N-Gain (0.85 vs. 0.60), and large effect size (1.29). It confirms that AR-assisted inquiry learning is significantly more effective and impactful in cultivating fifth-grade students' critical thinking skills than the conventional picture-assisted scientific approach.

Conclusion

This study concludes that implementing the Augmented Reality-assisted inquiry learning model produces a statistically significant and substantial improvement in fifth-grade students' critical thinking skills regarding the human digestive system compared to a picture-assisted scientific approach ($p = 0.001$, effect size = 1.29). Students in the experimental group achieved a high overall N-Gain of 0.85 (compared to 0.60 in the control group), with the strongest improvement observed in the *elementary clarification* indicator (N-Gain = 0.88) and the lowest yet still high gain in *strategies and tactics* (N-Gain = 0.77). In contrast, the control group exhibited its highest gain in *basic support for decision-making* (N-Gain = 0.76) and a low gain in *strategies and tactics* (N-Gain = 0.33). These findings underscore the pedagogical value of integrating interactive 3D AR visualizations within an inquiry-based framework to transform abstract science content into engaging, cognitively stimulating learning experiences for elementary students.

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Authors' Note

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

References

Anggraeni, N., Rustini, T., & Wahyuningsih, Y. (2022). Keterampilan berpikir kritis siswa sekolah dasar pada mata pelajaran IPS di kelas tinggi. *Jurnal Review Pendidikan Dasar:*

Jurnal Kajian Pendidikan dan Hasil Penelitian, 8(1), 84–90. https://doi.org/10.26740/jrpd.v8n1.p84-90

Firdausi, B. W., Yermiandhoko, Y., & Surabaya, U. N. (2021). Kemampuan berpikir kritis pada siswa sekolah dasar merupakan hal yang wajib dikembangkan. *11*(2), 229–243.

Gultom, A. F. (2025a). Revitalizing Pancasila as living philosophy: Socratic-based classroom experimentation to foster critical thinking skills. *Paidea: Jurnal Pendidikan dan Pembelajaran Indonesia, 5*(2), 78–91. https://doi.org/10.56393/paidea.v5i2.4174

Gultom, A. F. (2025b). Toward a transformative multicultural pedagogy: The role of cultural empathy in university. *Didactica: Jurnal Kajian Pendidikan dan Pembelajaran, 5*(2), 60–74. https://doi.org/10.56393/didactica.v5i2.4175

Inayah A. M., M., Lolotandung, R., & Irmawati M. (2023). Pengaruh model pembelajaran PAKEM terhadap hasil belajar IPA siswa di sekolah dasar. *Elementary Journal: Jurnal Pendidikan Guru Sekolah Dasar, 6*(1), 29–38. https://doi.org/10.47178/elementary.v6i1.2056

Inayati, M. (2022). Penerapan model pembelajaran berbasis masalah (problem based learning) dalam pembelajaran PAI; teori David Ausubel, Vigotsky, Jerome S. Bruner. *Al Yasini: Jurnal Keislaman, Sosial, Hukum dan Pendidikan, 7*(2), 144. https://doi.org/10.55102/alyasini.v7i2.4875

Manurung, A. S., Utomo, E., & Gumelar, G. (2023). Implementasi berpikir kritis dalam upaya mengembangkan kemampuan berpikir kreatif mahasiswa. *5*(2), 120–132.

Nisah, N., Widiyono, A., Lailiyah, N. N., Pendidikan, P., & Sekolah, G. (2021). Keefektifan model project based learning terhadap peningkatan hasil belajar IPA di sekolah dasar. *8*(2), 114–126. https://doi.org/10.25134/pedagogi.v8i2.4882

Pratiwi, D. E., & Mawardi, M. (2020). Penerapan model pembelajaran inquiry dan discovery learning ditinjau dari keterampilan berpikir kritis pada mata pelajaran matematika di sekolah dasar. *Jurnal Basicedu, 4*(2), 288–294. https://doi.org/10.31004/basicedu.v4i2.345

Pratiwi, N. W. C., Margunayasa, I. G., & Lasmawan, I. W. (2024). Media pembelajaran augmented reality berbasis Profil Pelajar Pancasila untuk meningkatkan minat belajar IPA kelas IV SD. *Jurnal Ilmiah Pendidikan Profesi Guru, 7*(1), 110–122. https://doi.org/10.23887/jippg.v7i1.73179

Puspita, A. A., Fitri, A. F., & Yuliani, N. V. (2023). Systematic literature review: Media pembelajaran IPA pada materi sistem pencernaan manusia di sekolah dasar. *SNHRP, 2*(202), 117–126.

Putri, I. C., Mauliddina, S. A., Nafisah, S., & Prihantini, P. (2023). Pengaruh penerapan strategi pembelajaran inkuiri terhadap kekurangan sikap berpikir kritis dan kreativitas siswa SD. *Naturalistic: Jurnal Kajian dan Penelitian Pendidikan dan Pembelajaran, 7*(2), 1500–1507. https://doi.org/10.35568/naturalistic.v7i2.2207

Sari, I. P., Batubara, I. H., Hazidar, A. H., & Basri, M. (2022). Pengenalan bangun ruang menggunakan augmented reality sebagai media pembelajaran. *Hello World Jurnal Ilmu Komputer, 1*(4), 209–215. https://doi.org/10.56211/helloworld.v1i4.142

Savitri, O., & Meilana, S. F. (2022). Pengaruh model pembelajaran flipped classroom terhadap pemahaman konsep IPA siswa sekolah dasar. *Jurnal Basicedu, 6*(4), 7242–7249. https://doi.org/10.31004/basicedu.v6i4.3457

Winarti, N., Maula, L. H., Amalia, A. R., Pratiwi, N. L. A., & Nandang. (2022). Penerapan model pembelajaran project based learning untuk meningkatkan kemampuan berpikir kritis siswa kelas III sekolah dasar. *Jurnal Cakrawala Pendas, 8*(3), 552–563. https://doi.org/10.31949/jcp.v8i3.2419

Yani, L., Sadrina, S., & Fathiah, F. (2023). Analisis kemampuan berpikir kritis siswa dalam penerapan metode jigsaw. *Jupiter (Jurnal Pendidikan Teknik Elektro), 8*(1), 58. https://doi.org/10.25273/jupiter.v8i1.16063

Yulisdiva, A., Sodikin, C., & Anggraeni, P. (2023). Perbandingan model pembelajaran read, answer, discuss, explain, and create (RADEC) dengan model pembelajaran inquiry terhadap kemampuan berpikir tingkat tinggi siswa pada materi gaya. *Jurnal Edukasi Sebelas April (JESA), 7*(1), 16–25. https://ejournal.unsap.ac.id/index.php/jesaTlp

Zamri, M., Pandia, H., & Mahara Asat, S. (2022). Sistem pakar diagnosa penyakit maag dan usus buntu berbasis web. *JEKIN - Jurnal Teknik Informatika, 2*(1), 24–34. https://doi.org/10.58794/jekin.v2i1.90

Zuhaida, A., & Yustiana, Y. R. (2023). Tantangan guru dalam mengajar IPA: Studi kasus guru. *Paedagoria: Jurnal Kajian, Penelitian dan Pengembangan Kependidikan, 14*(3), 226–231.