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Impact of an AI-driven teacher dashboard on student performance in inquiry-based science learning

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Abstract

This research examined the use of Poll Everywhere, an AI-based teacher dashboard, as a part of inquiry-based learning (IBL) for the Grade 7 students at Carrascal National High School during the 2024–2025 school year. Using a quasi-experimental research design with two groups of students; an experimental group of 46 students using AI-driven instruction and a control group of 43 students using direct instruction without AI support, results showed that both groups of students had developed in their student learning outcomes for academic performance after pre-test to post-questionnaire analysis; however, the experimental group developed significantly larger than the control group, indicating a stronger impact of the teacher's use of the AI-based dashboard on student learning outcomes compared to their use of a more traditional instructional approach with students. The research also identified some of the benefits of using AI-driven instruction and learning with inquiry-based science learning. Specifically, student engagement with their learning was deeper due to the immediate and interactive delivery of feedback from Poll Everywhere's dashboard, as students had an opportunity to concentrate on better academic performance and learning. Overall, the study indicates that learning and development in science can be significantly accelerated by AI-driven tools, including Poll Everywhere, that will develop student knowledge compared with teaching using a more conventional instructional approach that promotes active engagement with learning and better retention of content.

Keywords: AI-driven; Inquiry-based learning; Poll everywhere; Artificial intelligence; Education; Student performance

1. Introduction

The rapid evolution of Artificial Intelligence (AI) in education has unlocked innovative approaches to enhance teaching and learning, particularly in science education, where inquiry, exploration, and critical thinking are central. With the increasing availability of intelligent tools that can support differentiated instruction, formative assessment, and personalized learning, educators are beginning to rethink traditional pedagogies. This study investigates the integration of an AI-driven teacher dashboard, *Poll Everywhere*, as a technological tool to support inquiry-based learning (IBL) among Grade 7 students. The research sought to evaluate the dashboard's effectiveness in improving learners' academic performance and classroom engagement as compared to conventional teaching strategies.

Educational dashboards are increasingly recognized as powerful supports for real-time, data-informed instruction. These systems provide immediate insights into learners' participation, comprehension, and areas of difficulty, thus enabling timely pedagogical interventions. Michaeli et al. (5) emphasize that dashboards strengthen teacher agency by helping them tailor instruction based on ongoing assessment of student needs. Seo (7) highlights the transformative role of AI in streamlining teaching tasks, personalizing instruction, and fostering student-centered environments. Meanwhile, Chiu et al. (1) argue that the underexplored dimension of student-teacher interaction mediated by AI systems warrants deeper investigation, especially regarding its effect on student motivation and satisfaction. As AI in

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Education (AIEd) continues to gain momentum, it is crucial to examine how context-specific tools such as *Poll Everywhere* can support core pedagogical approaches like inquiry-based learning, particularly in science, where active student involvement is critical.

Despite national initiatives promoting the integration of technology into classrooms, the adoption of AI tools in many public schools in the Philippines remains inconsistent, especially in rural areas. With this the study aims to fill this gap by analyzing the effectiveness of the AI-driven teacher dashboard, *Poll Everywhere*. Hence, the study specifically aims to investigate the pre-test and post-test mean scores of Grade 7 students using the Poll Everywhere AI-based dashboard compared to those using conventional teaching methods and the significant difference between the scores and the methods utilized.

Ultimately, the significance of this study lies in both its practical relevance and theoretical contributions. Practically, the findings aim to inform science teachers, school administrators, and policymakers on how AI-integrated tools can be implemented to improve instructional delivery and learner outcomes in science education. Insights gained from this research may support the development of more responsive teaching practices and evidence-based guidelines for AI adoption within the DepEd's curriculum and teacher training programs.

2. Material and methods

This study utilized a quasi-experimental research design involving two groups: a control group and an intervention group. This design is an approach that mimics experimental conditions without random assignment, using statistical techniques to reduce bias (2).

The study was conducted among Grade 7 students at Carrascal National High School during the 2024–2025 school year. A total of 89 students were purposively selected from two intact, heterogeneous sections. Section 1, composed of 46 students, was designated as the experimental group, receiving instruction enhanced by the AI dashboard. Section 2, with 43 students, served as the control group, receiving conventional instruction without the AI tool.

The primary research instrument was a researcher-developed 50-item multiple-choice questionnaire, administered as both a pre-test and post-test. The questionnaire was created based on the second quarter learning competencies of the MATATAG Curriculum in Grade 7 Science with concurrent content validation and reliability testing. Descriptive statistics including mean, standard deviation, and range were used to summarize data to evaluate and compare group performance. Using descriptive statistics allowed researchers to capture measures of central tendency and variability in students' scores, which was used to make meaningful inferences about the impact of the AI-enhanced intervention.

3. Results and discussion

3.1. Pre-Test and Post-Test Mean Scores of Grade 7 Students Using the Poll Everywhere AI-Based Dashboard Versus Conventional Teaching Methods

Table 1 displays the pre-test and post-test mean scores of Grade 7 students who participated in the study, comparing two groups: the experimental group, which utilized the Poll Everywhere AI-based teacher dashboard, and the conventional group, which was taught using traditional instructional methods. This comparison seeks to determine the effectiveness of the AI-driven dashboard in improving students' performance in inquiry-based science learning.

Table 1 Pre-Test and Post-Test Mean Scores of Grade 7 Students in the Experimental and Conventional Groups

Mean Score	**Experimental**		**Conventional**	
	Pre-Test	Post Test	Pre-Test	Post Test
	11.45	21.85	13.82	20.42

It can be gleaned from the table that the experimental group obtained a mean score of 11.45 in the pre-test and 21.85 in the post-test, resulting in a gain of 10.40 points. In contrast, the conventional group had a slightly higher mean pre-test score of 13.82, which increased to 20.42 in the post-test, indicating a gain of 6.60 points. While both groups demonstrated improvement, the experimental group showed a greater increase in performance from pre- to post-test.

This difference in learning gains suggests that the integration of the AI-based teacher dashboard contributed more significantly to students' academic improvement compared to the conventional teaching method. The experimental group, which started with a lower pre-test score, not only caught up but outperformed the conventional group in the post-test. This outcome reflects the potential of AI-enhanced tools to support and accelerate student learning through targeted feedback and real-time instructional adaptation.

The observed improvement in the experimental group aligns with recent research emphasizing the pedagogical benefits of AI in education. According to Seo (7), AI systems can personalize instruction, adapt to individual learning needs, and offer timely feedback—features that are highly effective in enhancing student outcomes. The real-time feedback mechanism embedded in AI dashboards is particularly valuable, as it allows students to correct misconceptions promptly and receive reinforcement when performing well. Mallalin (4) and M and Quraishi (6) likewise stated that such dynamic feedback not only boosts academic performance but also increases engagement and motivation.

Significant Difference Between Pre-Test and Post-Test Mean Scores of Grade 7 Students Using *Poll Everywhere* AI-Based Dashboard and Conventional Teaching Methods

Table 2 presents the statistical results examining whether there is a significant difference between the pre-test and post-test mean scores of Grade 7 students taught through two different instructional approaches: the conventional method and the Poll Everywhere AI-based dashboard. The purpose of this analysis is to determine the effectiveness of each teaching strategy in enhancing students' academic performance in science.

For the conventional group, the comparison between pre-test and post-test scores yielded a test statistic of 13.54 and a p-value of 0.000, which is below the standard significance level ($\alpha = 0.05$). Similarly, for the experimental group using the Poll Everywhere AI-based dashboard, the results showed a higher test statistic of 23.40 and the same p-value of 0.000. In both cases, the null hypothesis (H_0)—which posits that there is no significant difference between the pre-test and post-test scores—was rejected. This indicates that both teaching methods produced statistically significant improvements in student performance.

Table 2 Difference Between the Mean Scores of the Students in the Pre-test and Post-test Using the Two Methods of Teaching Grade 7 Science

Methods	**Test Statistics**	**p-value**	**Decisions**	**Conclusions**
Conventional (Pre-test vs Post-test)	13.54	0.000	Reject H_0	Significant
Poll Everywhere AI-based dashboard (Pre-test vs Post-test)	23.40	0.000	Reject H_0	Significant

Although both groups demonstrated significant gains, the larger test statistic (23.40) for the experimental group compared to 13.54 for the conventional group suggests a stronger effect of the AI-based dashboard on student learning outcomes. A higher test statistic reflects a greater difference between pre-test and post-test means, implying that the intervention had a more substantial impact. These results affirm the superiority of AI-enhanced instruction over the conventional method in facilitating inquiry-based science learning.

The p-values of 0.000 indicate that the observed differences in pre-and post-test scores for both groups are highly significant and unlikely to have occurred by chance. These results validate the effectiveness of each instructional approach; however, the markedly higher effect in the experimental group points to the added pedagogical value of integrating AI technologies into classroom instruction.

The observed findings align with recent studies supporting the role of AI in improving learning outcomes. Seo (7) emphasizes that AI-driven platforms can personalize instruction and adapt content to students' performance in real-time, promoting deeper understanding and sustained engagement. The real-time feedback and interactivity provided by platforms like Poll Everywhere are also consistent with findings by M and Quraishi (6), who reported that AI tools contribute to higher academic gains by addressing learning needs instantaneously and dynamically.

Moreover, Margolis (3) connects such improvements to Vygotsky's Zone of Proximal Development, where AI acts as an effective scaffolding mechanism that bridges learners from their current understanding to more complex scientific concepts. Taskin (8) further asserts that AI technologies foster personalized and inquiry-driven learning environments, enhancing both cognitive and affective aspects of education

4. Conclusion

The Poll Everywhere AI-based dashboard demonstrated superior effectiveness in enhancing Grade 7 science performance compared to conventional teaching methods, as evidenced by the experimental group's greater improvement in post-test scores despite starting at a lower baseline. The AI tool's capacity to deliver real-time feedback and adaptive instruction likely contributed to closing initial performance gaps and fostering deeper conceptual understanding. These results underscore the potential of AI-driven tools to complement traditional pedagogy by personalizing learning experiences and addressing individual student needs more dynamically.

Moreover, while both instructional approaches yielded statistically significant gains, the markedly higher test statistic for the experimental group highlighted the AI dashboard's stronger pedagogical impact. The tool's ability to provide immediate, interactive feedback appeared to amplify learning outcomes, suggesting that AI-enhanced methods can accelerate progress in inquiry-based science education more effectively than conventional strategies alone. This distinction emphasizes the value of integrating technology that actively engages students and adapts to their learning trajectories.

Thus, to enhance science education through AI integration, teachers could explore embedding tools like the Poll Everywhere AI dashboard into daily lessons to harness its real-time feedback and adaptive features, tailoring instruction to address individual student needs

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest is to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

References

[1] Chiu TKF, Moorhouse BL, Chai CS, Ismailov M. Teacher support and student motivation to learn with Artificial Intelligence (AI) based chatbot. Interact Learn Environ. 2023 Feb 6;1–17.

[2] Heeyun K, Clasing-Manquian P. Quasi-Experimental Methods: Principles and Application in Higher Education Research. In: Huisman J, Tight M, editors. Theory and Method in Higher Education Research [Internet]. Emerald Publishing Limited; 2023 [cited 2025 Apr 29]. p. 43–62. Available from: https://www.emerald.com/insight/content/doi/10.1108/S2056-375220230000009003/full/html

[3] Margolis AA. Zone of Proximal Development, Scaffolding and Teaching Practice. Cult-Hist Psychol. 2020;16(3):15–26.

[4] Mallillin LLD. Artificial Intelligence (AI) Towards Students' Academic Performance. Innovare J Educ. 2024 Jul 1;16–21.

[5] Michaeli S, Kroparo D, Hershkovitz A. Teachers' Use of Education Dashboards and Professional Growth. Int Rev Res Open Distrib Learn. 2020 Jul 23;21(4):61–78.

[6] M R, Quraishi DrAH. Leveraging Artificial Intelligence for Student Performance Monitoring. Int J Res Publ Rev. 2024 May 17;5(5):9642–5.

[7] Seo K, Tang J, Roll I, Fels S, Yoon D. The impact of artificial intelligence on learner–instructor interaction in online learning. Int J Educ Technol High Educ. 2021 Dec;18(1):54.

[8] Taşkın M. Artificial Intelligence in Personalized Education: Enhancing Learning Outcomes Through Adaptive Technologies and Data-Driven Insights. Hum Comput Interact. 2025 Jan 8;8(1):173.