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Submission date: 18-Mar-2025 08:08PM (UTC-0700)
Submission ID: 2618763244
File name: ส่งบทความสำหรับวารสารชาวอินโดนีเซียปี_2025.docx (93.34K)
Word count: 2307
Character count: 13825

Journal of Education and Teacher Training Innovation (JETTI)
Published by Pusmedia Group Indonesia

Implementing Inquiry-based Science Learning on the Topic World and its Changing of Grade 8 Students

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Abstract

The objectives of this study were 1) to improve academic achievement on the topic of the world and change using the inquiry-based learning management of grade 8 students to meet the criterion of 70% of the full score, and 2) to study the satisfaction of learning management by using inquiry-based learning management. The research tools used in the study were: 5 learning management plans with a total of 10 hours, 4 multiple-choice achievement tests with 20 questions, and satisfaction questionnaire on learning management by using inquiry-based learning as a 5-level estimation of 10 items. The descriptive statistics were used by percentage, mean, and standard deviation. The results showed that the academic achievement of grade 8 students was 15.94 or 88.89% of full score, and the students who did not pass accounted for 11.11%. Also, they had highest level of satisfaction towards learning management. The study can be used and implied to science classroom for promoting science lessons and instructional practices.

Keyword : Implementing, Inquiry-based, Science Learning, Topic World and its Changing

Introduction

The 2008 Basic Education Core Curriculum is an extension of the 2008 Basic Education Curriculum and aims to develop learners to be complete human beings both physically and mentally, knowledge, morality, ethics, and a sense of Thainess. Adhere to the regime of democracy, the monarch is the head of state. Learners must be knowledge owner that is relevant to professional practice. The aim is to make learners important on the basis of the belief that everyone can learn and develop themselves to their full potential, and to aim for learners to be good, intelligent, happy, and have the potential to continue their education and career (Rotaru, 2021; Karatsiori, 2023; Nuangchalerm et al., 2024a; Nuangchalerm et al., 2024b).

Science and technology are the subjects that drive the progress of the country. It develops the nation's youth with other developed countries (Shavkidinova et al., 2023). The government must support and improve the country's education system to improve living in today's highly developed society. It can be considered that it is the duty of all parties to urgently adjust the corrections, especially teachers who are the managers of teaching and learning in the classroom. The teacher will convey the content to the students with a variety of teaching styles (Moşteanu, 2021; Moè et al., 2022). Teachers must have a way to manage teaching and learning to be interesting and motivate students to learn in accordance with the better science achievement (Ozcan, 2021).

Science learning in this era requires students' understanding of the nature of science and technology that equipping them with skills to navigate a rapidly changing world. Inquiry-based science learning. A pedagogical approach emphasizing students learn to have exploration, questioning, and hands-on experimentation (Salinas-Navarro et al., 2024). It emerges a transformative strategy to foster deeper comprehension and engagement among students to meet science education. This method aligns well with contemporary educational frameworks that prioritize critical thinking, problem-solving, and active participation over rote memorization.

For grade 8 students in Thailand, the study of earth and its dynamic changes provides a compelling context for inquiry-based learning. Exploring phenomena such as global warming, climate change, environmental degradation, and environmental transformations. Engaging students to deal with learning science activities that simulate real-world scientific practices, students can develop essential competencies, including hypothesis formulation, data collection, evidence-based reasoning, and concluding their learning outcomes (Asiyah et al., 2024; Kotsis 2024).

The researchers has studied the inquiry-based learning, which is the process of organizing learning activities used in learning science and technology. Students can build knowledge through a variety of learning processes, especially the process of seeking knowledge. It is a teaching that focuses on the process of seeking knowledge that will help students discover various truths on their own. The objective of this study aims to improve academic achievement by using the inquiry-based learning of grade 8 students to pass 70% of the full score and to study the satisfaction of learning management by using inquiry-based learning management.

Research Methodology

The study's population comprised 18 classes, totalling 670 students, from Phadung Naree School in the Mueang District of Mahasarakham Province during the second semester of the academic year 2023. This study makes use of several different methods, including: 1) an inquiry-based learning management plan with five steps, 2) four multiple-choice accomplishment assessments with twenty questions, and 3) ten satisfaction surveys for learning management.

The researchers gathered the data by following the steps outlined in the data-collecting procedure. The researcher randomly selected a sample of thirty-six kids from Phadung Naree School, located in the Mueang District of the Mahasarakham Province, during the second semester of the 2023 school year. Inquiry-based learning management with students, the researchers were able to clarify the goals, as well as provide an evaluation of academic performance and get an understanding of learning management. After completing all the material instruction, the researchers administer a post-test based on a scientific accomplishment exam to the students. Finally, the researchers inquire about the level of satisfaction experienced by the students and then evaluate the data. The researchers evaluate the findings by calculating the average score at the highest, high, medium, low, and lowest levels combined.

Result and Discussion

The data analysis showed that 70% of the students passed the achievement score and 4 students had 70% of the achievement scores, of which 88.89% of the students passed and 11.11% of the students who did not pass the standard of 15.94 points, which compared to the 70% threshold is considered to have passed the criteria (Table 1).

Table 1 Academic achievement of grade 8 students with the threshold of 70%

Students	Full score	criterion 70%	Mean	Interpretation
36	20	14	15.94	Pass the criterion

Academic achievement of grade 8 students with an average score of 15.94 points, which is considered to be a pass compared to the 70% threshold. The students achieved 70% of the full score, accounting for 88.89% of the total 36 students. The students had an average score of 15.94, accounting for 79.50%, which was found to pass the criteria of 70%. They have observed, experimented, and practiced until they understand and let them learn as well. Lessons help motivate students to be interested in learning and encourage them to enjoy learning, resulting in their developing more learning skills.

Students' academic achievement averaged 15.94 points, representing 79.50% of the total score. This indicating showed that students have successfully met the criteria. Methods such as observation, experimentation, and practice directly impact to students' performance. Inquiry-based learning is likely contributed to their understanding and ability to achieve high scores. Also, it encourages student-centered learning with a strong pedagogical strategy that supports deeper understanding and retention.

Constructivist learning theory provides a framework which is a constructive process. This theory emphasizes hands-on and engage students in activities such as observation, experimentation, and practice to construct their own understanding of concepts (Anderson et al., 2021; Chuang, 2021; Spaan et al., 2024). It also develops deeper conceptual understanding rather than just memorizing content. The high achievement (88.89% passing rate) suggests that active engagement helped students internalize knowledge more effectively than passive instruction.

Constructivist theory emphasizes the role of social interaction and scaffolding in learning. Students are likely collaborated, discussed, and engaged in guided problem-solving activities. The Zone of Proximal Development (ZPD) concept suggests that with appropriate support, students can achieve more than they could independently (Barrs, 2021; Newman & Latifi, 2021). The improvement in scores indicates that teachers or peers provided scaffolding that facilitated the transition from basic understanding to mastery. The high pass rate (88.89%) and average score of 79.50% suggest that constructivist teaching methods effectively supported student learning. The findings align with Piaget's and Vygotsky's theories, emphasizing active, inquiry-based, and socially interactive learning as key drivers of academic success.

This study suggests that the educational approach not only helped students pass but also equipped them with skills that may be transferable to other areas of study. When studying the satisfaction with the inquiry-based learning management, it was

found that the students were at highest level of satisfaction towards learning management (Table 2).

Table 2 Students' satisfaction with the management of inquiry-based learning

Item	Mean	SD
1. Learning management activities are consistent with the content	4.83	0.38
2. Teachers are ready to use media and equipment for learning activities	4.78	0.42
3. Learning management allow students to learn the content of science easier to understand	4.81	0.47
4. Learning activities are fun and interesting	4.75	0.50
5. Learning activities to meet the needs of students	4.75	0.55
6. Students enjoy learning management activities	4.78	0.42
7. Learning management make students like science courses more	4.75	0.50
8. Students have more courage to work with others	4.78	0.42
9. Students have summarized their knowledge by themselves, with the teacher giving advice	4.86	0.35
10. Students have studied and researched from various learning sources	4.86	0.35
Average	4.79	0.44

Table 2 shows that when considered individually, it is found that there are 10 items with the highest level of satisfaction, including item 9. And in Question 10, students have studied and researched from various learning sources ($\bar{X}$=4.86, SD=0.35). The highest average is item 1, learning management activities are consistent with the content ($\bar{X}$= 4.83, SD=0.38), and the item 3, learning management makes the content of science easier to understand ($\bar{X}$= 4.81, SD=0.47) respectively.

We can discuss a successful implementation of inquiry-based learning for grade 8 students. Students demonstrated strong academic performance with an average score of 15.94 points (79.50%), exceeding the 70% pass threshold. This suggests the learning process was effective in meeting academic goals. The satisfaction is at the highest level across all 10 aspects of the learning process, with an overall average score of 4.79 (SD = 0.44). The use of active, hands-on methods such as observation, experimentation, and practice enhanced comprehension and skill development. Inquiry-based learning fostered collaboration, enjoyment, and motivation, resulting in students developing more confidence and a greater liking for science subjects.

The high satisfaction levels align with constructivist learning theories, particularly those proposed by Piaget and Vygotsky. The results reinforce the effectiveness of inquiry-based learning in improving students' engagement, comprehension, and research skills. Educators should continue integrating this approach into science curriculum. Students enjoyed and interest in learning activities,

which made learning fun and relevant (Malone & Lepper, 2021 Abnisa & Zubairi, 2022). They are more likely to retain concepts and skills, self-learning, summarize knowledge, and reflect of what they have learned. The study suggested that inquiry-based learning goes beyond traditional learning or recitation the science contents for examination. This approach in this context highlights its potential for replication in other subjects or grade levels for helping students meet nature of science education.

Acknowledgement

This research project is financially supported by Mahasarakham University.

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