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Inquiry-Based Science Learning for Generation Alpha: Digital-Native Learning Style

Dimas Raba Pramodana *[1].

[1]*UIN Raden Intan Lampung*
dimasssrabap@gmail.com

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ABSTRACT. Generation Alpha is a group of students born and raised in the digital era, thus possessing a distinctive learning style as digital natives. They tend to be responsive to interactive media, accustomed to instant information, and more comfortable with technology-based learning. This condition demands innovation in science learning that suits their characteristics. The purpose of this study is to analyze inquiry-based science learning adapted to the learning styles of Generation Alpha through a literature review. The study used a qualitative approach with a literature study method that reviewed articles, books, and research reports from the last five years related to inquiry, science, and the digital generation. The analysis was conducted descriptively and qualitatively by identifying key themes and their relevance. The results of the study indicate that inquiry learning is effective in increasing curiosity, critical thinking skills, and active participation of Generation Alpha students. Furthermore, the integration of digital media in inquiry strategies has been shown to strengthen learning motivation and collaborative skills. The study's conclusion confirms that an inquiry-based science learning model oriented towards digital-native learning styles is highly relevant for preparing Generation Alpha to face the challenges of the 21st century.

Keywords: *inquiry learning; Generation Alpha; digital-native.*

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INTRODUCTION

The rapid advancement of digital technology has given rise to a new generation known as generation alpha. Born after 2010, this generation has been surrounded by digital devices such as smartphones, tablets, and the internet since birth (mccrindle & fell, 2020). As a result, they are true digital natives with learning styles distinct from previous generations. Generation alpha tends to acquire information quickly, think visually, and respond more effectively to technology-based learning environments (rahmawati & nugroho, 2021).

In the context of science education, this condition presents both challenges and opportunities. On one hand, teachers are required to adapt their teaching strategies to suit students' characteristics in order to maintain engagement. On the other hand, the presence of technology provides vast opportunities to support exploration- and experiment-based learning. One approach considered suitable is the inquiry-based learning model, which emphasizes students' active roles in discovering concepts through questioning, observation, and analysis—aligning well with generation alpha's strong curiosity (putri & sari, 2020).

The research problem in this study is directed toward the question: how can inquiry-based science learning be adapted to the digital-native learning style of generation alpha? The focus of

this study lies in examining the relationship between inquiry strategies, digital media, and student characteristics in enhancing the effectiveness of science learning. The purpose of this research is to provide a conceptual analysis through a literature review on the relevance of inquiry-based learning to generation alpha's learning style while highlighting its potential contribution to science education in indonesia.

Previous studies have shown that inquiry-based learning is effective in improving students' understanding of scientific concepts, critical thinking skills, and learning motivation (hidayat & prasetyo, 2021). Furthermore, the integration of digital media within inquiry-based learning enhances student engagement and facilitates collaboration (nurhayati & widodo, 2022). However, the identified research gap lies in the limited number of studies explicitly connecting inquiry strategies with the learning styles of generation alpha. Most existing studies focus on the general effectiveness of inquiry learning without adapting it to the inherent digital-native characteristics of today's students (firmansyah & azizah, 2020).

The novelty of this study lies in its synthesis of literature that positions generation alpha as the main focus, thereby providing a new conceptual framework for inquiry-based science learning. The scientific contribution of this study extends beyond theoretical insights into instructional strategies it also offers practical implications for teachers in designing learning experiences that align with the needs of the digital generation. Thus, this study underscores the urgency of adapting inquiry-based learning strategies to suit generation alpha's learning styles, aiming to cultivate 21st-century competencies such as critical thinking, collaboration, and digital literacy (andriani & syamsudin, 2022).

METHOD

This study employed a qualitative research design with a literature study approach. The selection of the literature study method was based on the research objective, which aimed to analyze and synthesize literature related to inquiry-based learning, generation alpha, and digital-native learning styles. This approach was considered appropriate for exploring conceptual frameworks, identifying patterns, and discovering scientific contributions derived from previous research findings (zed, 2019).

Data sources

the data sources for this study were drawn from nationally accredited journals, reputable international journals, academic books, and conference proceedings published within the last five years. This time frame was selected to ensure data relevance and currency, although several classical works were also used to reinforce the theoretical foundation (arifin & sari, 2020).

Data collection techniques

data collection was conducted through a systematic search of databases such as google scholar, doaj, garuda, and researchgate. The keywords used included *inquiry-based learning*, *generation alpha*, *digital-native learning style*, and *science education*. The selected articles were filtered based on inclusion criteria—namely, relevance to the research focus—and exclusion criteria, which eliminated non-scientific or opinion-based works (handayani & yusuf, 2021).

Data analysis techniques

data analysis employed the content analysis technique, following the stages of data reduction, categorization, synthesis, and conclusion drawing (miles, huberman, & saldaña, 2018). In the data reduction stage, irrelevant articles were excluded. Key information from relevant sources was then categorized into themes such as the contribution of inquiry-based learning,

generation alpha's learning styles, and the integration of digital technology. The synthesis process involved comparing findings across studies to identify conceptual patterns and interrelationships.

Data validity

data validity was maintained through source triangulation by comparing findings from various types of literature. Validity was further strengthened by selecting peer-reviewed journal articles and academic books from reputable publishers (moleong, 2021). Through this process, the research findings were ensured to be scientifically reliable and capable of making a credible contribution to the field of science education studies.

RESULT AND DISCUSSION

Result

The literature analysis of 30 journal articles, books, and conference proceedings published within the last five years produced three main findings. First, the inquiry-based learning model has been proven effective in enhancing students' critical thinking skills, creativity, and scientific literacy. Second, Generation Alpha, as digital natives, possesses learning styles different from previous generations, requiring adjustments in instructional strategies. Third, the integration of digital technology in inquiry-based learning supports students' motivation, collaboration, and active participation.

Table 1 Summary of Key Research Findings on STEAM

No.	Fokus Kajian	Temuan Utama	Sumber
1	Inquiry in science	Effectively improve scientific literacy and critical thinking skills	(Herlina & Saputra, 2021)
2	Generation Alpha	Have a visual, fast, multitasking, and digital-native learning style	(Fauziah & Pratama, 2022)
3	Technology integration	Digital media strengthens student motivation and engagement	(Yulianto & Rahayu, 2022)

The results of this study confirm that inquiry learning combined with digital technology is very relevant to the characteristics of Generation Alpha.

Discussion

Effectiveness of the Inquiry Model in Science Learning

Inquiry-based learning has been proven to encourage students to actively ask questions, design experiments, and analyze data. This process not only strengthens students' understanding of scientific concepts but also develops critical thinking and problem-solving skills (Rosyid & Hamid, 2020). Other studies show that students who learn through inquiry tend to be more independent and demonstrate higher levels of scientific literacy compared to those taught using conventional methods (Hidayati & Kurniawan, 2020). These findings align with constructivist theory, which emphasizes the active role of students in constructing knowledge through direct experience (Supriyadi, 2019). Therefore, inquiry serves as an appropriate model to equip Generation Alpha with essential 21st-century skills.

Characteristics of Generation Alpha and Their Implications

Generation Alpha exhibits distinct learning preferences due to their upbringing in a digital environment. They favor visual, fast-paced, interactive, and technology-driven learning experiences (Lubis & Kartika, 2021). When teachers rely on traditional lecture-based methods, student

engagement tends to decline (Fauziah & Pratama, 2022). Consequently, teachers need to design inquiry-based learning that integrates digital technologies such as virtual laboratories, interactive simulations, or game-based applications. In doing so, the digital-native characteristics of Generation Alpha can be optimally accommodated (Mustaqim, 2020).

Integration of Digital Technology in Inquiry-Based Learning

Integrating digital technology into inquiry-based learning not only enhances students' motivation but also fosters collaboration among them. For instance, using online discussion platforms allows students to engage in virtual discussions and experiments (Sulastri & Dewi, 2021). Other studies have found that incorporating technology into inquiry learning boosts creativity, as students can visualize scientific concepts more concretely (Yulianto & Rahayu, 2022). Moreover, digital media serves as a form of scaffolding that supports students in understanding complex concepts (Syahrial, 2019). Thus, technology integration is not merely a supplement but an integral component of effective inquiry-based learning for Generation Alpha.

Research Gap and Scientific Contribution

Most previous studies confirm the effectiveness of inquiry-based learning in improving student outcomes. However, few studies have specifically aligned inquiry strategies with the learning styles of Generation Alpha. This gap highlights the need for conceptual research linking inquiry learning with digital-native characteristics. The scientific contribution of this study lies in affirming that the success of inquiry-based learning for Generation Alpha greatly depends on the integration of digital technology and the adaptation of teaching strategies to student characteristics. Therefore, this research expands academic discourse and provides direction for future empirical studies in Indonesian schools.

CONCLUSION

This study concludes that inquiry-based science learning is highly relevant for Generation Alpha, characterized as digital natives. The literature review findings indicate that the inquiry model effectively enhances students' scientific literacy, critical thinking skills, and independence. Generation Alpha, with its visual, fast-paced, and interactive learning style, requires the integration of digital technology to maintain active engagement. The incorporation of technology within inquiry learning has been proven to strengthen students' motivation, creativity, and collaboration addressing the core needs of 21st-century education.

Thus, this research emphasizes that inquiry-based learning combined with digital media is not merely an alternative but a necessity in science education for Generation Alpha. The practical implication of this study highlights the importance of improving teachers' digital competence and designing inquiry-based learning that is contextual, innovative, and aligned with the learning styles of digital-native students.

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