

From Inquiry to Learning: Exploring Non-Mathematics Students' Experiences with Inquiry-Based Learning (IBL) Approach

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ABSTRACT

Non-mathematics students in tertiary education encounter varied academic demands that require active participation, critical thinking, collaboration, and independent learning, yet their experiences with inquiry-based learning (IBL) remain insufficiently understood. This qualitative study examines how non-mathematics students experience and navigate IBL within their classroom contexts. Using purposive sampling, the researchers conducted focus group discussions with selected tertiary-level non-mathematics students and analyzed the data through a grounded theory approach to identify recurring concepts, categories, and emerging themes. The findings highlighted four central dimensions of students' experiences: active and participatory engagement, development of higher-order thinking and problem-solving skills, collaborative learning, and application of knowledge to meaningful and authentic situations. Furthermore, the findings revealed that complex inquiry tasks, limited time, group dynamics, varying levels of confidence and preparedness, and insufficient guidance can constrain students' engagement and learning. To support meaningful inquiry experiences, students emphasized the importance of clear instructional guidance, appropriate scaffolding, supportive classroom environments, manageable learning activities, and responsive teacher facilitation. Teachers play a critical role in balancing student autonomy with structured support, particularly when learners encounter uncertainty or difficulty in navigating open-ended inquiry tasks. The study concludes that effective IBL among non-mathematics students requires pedagogical responsiveness, appropriate instructional structure, and learning environments that enable students to actively participate, collaborate, think critically, and construct meaningful understanding.

Keywords: Inquiry-based learning, student experiences, non-mathematics students, qualitative study, grounded theory, student-centered learning

INTRODUCTION

Inquiry-based learning (IBL) has increasingly become an important feature of contemporary education as institutions shift toward learner-centered approaches that emphasize active participation, knowledge construction, and higher-order thinking among non-mathematics students (Sam, 2024; Dah et al., 2024). Rather than positioning learners primarily as recipients of information, IBL requires students to formulate questions, investigate problems, examine evidence, construct explanations, and reflect on their understanding. This approach reflects a constructivist view of learning, in which knowledge is developed through active engagement with prior experiences, learning tasks, and social interactions. Aisyah (2022) similarly demonstrated that inquiry-based learning encourages students to actively examine information, formulate ideas, and develop critical thinking rather than simply receive knowledge from teachers. The cognitive demands of inquiry require students to move beyond information recall toward analysis, evaluation, explanation, and knowledge creation, which correspond to the higher levels of cognition identified in the revised Bloom's Taxonomy (Anderson & Krathwohl, 2020; Anderson et al., 2020). Alqurashi (2020) further reported that IBL can strengthen critical thinking through questioning, analysis, evaluation, and problem-solving. Consequently, IBL is increasingly understood not merely as an instructional technique but as a multidimensional learning process that shapes how non-mathematics students participate, reason, collaborate, and make meaning from academic content (Chen & Chen, 2025; Sasse et al., 2025).

Navigating the cognitive and learning demands of inquiry requires students to assume greater responsibility for their learning while transitioning from teacher-directed instruction toward active investigation and knowledge construction. Within inquiry activities, non-mathematics students may need to interpret information, compare explanations, evaluate evidence, solve unfamiliar problems, and justify conclusions. Although these processes can promote deeper cognitive engagement, they may also create uncertainty, particularly when students have limited experience with open-ended learning tasks. Dah et al. (2024) found that the effectiveness of open inquiry is closely associated with classroom management, instructional flexibility, teacher-student interaction, and appropriate instructional support, while Sam (2024) emphasized student readiness and conducive learning environments. Teachers therefore serve as important facilitators of students' cognitive and academic engagement. Attard et al. (2021) demonstrated that teacher professional learning and authentic partnerships can positively influence student engagement in inquiry-based learning, while Anderson and Williams (2022) emphasized the importance of experienced educational leadership in supporting the implementation and sustainability of inquiry-

oriented practices. Teacher experience is likewise relevant because effective facilitation requires an appropriate balance between student independence and instructional guidance (Benson & Perry, 2021). These perspectives indicate that successful IBL among non-mathematics students depends not only on the design of inquiry tasks but also on the availability of appropriate teacher, classroom, and institutional support.

The experience of inquiry is also shaped by social interaction, collaboration, and engagement. Collaborative inquiry requires students to communicate ideas, negotiate interpretations, share responsibilities, and construct knowledge with peers while teachers provide guidance and adaptive support (Chen & Chen, 2024; Chen & Chen, 2025). Chen and Chen (2024) emphasized that technology-supported collaborative inquiry can assist learners across different stages of the inquiry process, while Chen and Chen (2025) highlighted the importance of examining students' inquiry behaviors and engagement throughout questioning, investigation, interpretation, collaboration, and reflection. Beetham and Sharpe (2020) similarly emphasized learner-centered and technology-supported environments that promote active participation, while Bell (2021) identified collaboration, communication, problem-solving, and independent learning as important competencies associated with inquiry- and project-based approaches. From the perspective of non-mathematics students, IBL may therefore provide opportunities to develop curiosity, independence, critical thinking, collaboration, and deeper engagement by allowing learners to investigate meaningful questions and apply knowledge to authentic situations. However, students may experience these opportunities differently depending on their readiness, previous exposure to student-centered learning, confidence in independent decision-making, ability to collaborate, and access to teacher guidance. Harleni et al. (2025), in a meta-analysis of 21 empirical studies, found a small but statistically significant overall effect of IBL on student learning outcomes and noted that instructional design, educational level, and student engagement may influence its effectiveness. Thus, the presence of inquiry activities alone does not guarantee meaningful learning; rather, students' interpretations, participation, interactions, and responses to instructional support are central to how inquiry is experienced.

Despite the growing literature on the cognitive, collaborative, and engagement-related benefits of inquiry-based learning, a critical empirical gap remains regarding how non-mathematics students themselves experience and navigate IBL. Existing studies have provided substantial evidence concerning critical thinking, learning outcomes, teacher preparation, collaborative inquiry, and instructional design (Aisyah, 2022; Alqurashi, 2020; Attard et al., 2021; Chen & Chen, 2024; Harleni et al., 2025). However, comparatively less attention has been given to the lived and experiential dimensions of inquiry among students outside mathematics-oriented contexts. In particular, there remains insufficient understanding of how non-mathematics students interpret inquiry tasks, transition from teacher-directed to student-directed learning, collaborate with peers, respond to uncertainty, manage cognitive demands, seek instructional support, and perceive the meaningfulness of inquiry activities. De Van Vo and Mooney Simmie (2024) further highlighted challenges in assessing scientific inquiry and capturing the complexity of students' inquiry capabilities through conventional approaches. Therefore, examining students' experiences is essential because learning outcomes alone may not explain how learners respond to the demands and opportunities created by IBL. Understanding these experiences can reveal the specific conditions, challenges, interactions, and forms of support that enable inquiry-based learning to become a meaningful and engaging learning process for non-mathematics students.

METHODS RESEARCH DESIGN

To examine the complexities of students' experiences with inquiry-based learning (IBL), this study employed a qualitative exploratory research approach. Qualitative inquiry is particularly appropriate when the purpose of research is to understand participants' experiences, perceptions, interpretations, and the meanings they attach to a phenomenon within its natural context. Recent qualitative studies in education demonstrate how students' narratives and reflections can provide deeper insights into learning experiences that may not be adequately captured through quantitative measures (Eguia & Padro, 2023; Tuguic & Bilan, 2023). This approach allows students to articulate how they engage with inquiry activities, respond to open-ended tasks, collaborate with peers, interpret teacher guidance, and navigate the opportunities and challenges encountered throughout the learning process. An exploratory design is appropriate when a phenomenon requires deeper investigation and when the researcher seeks to allow patterns and themes to emerge from participants' accounts rather than imposing predetermined explanations (Divina, 2023). This methodological orientation is particularly relevant to the present study because the International Baccalaureate (IB) explicitly integrates inquiry-based teaching and learning across its programs and subjects, while research continues to call for closer examination of how inquiry is understood and experienced within actual classroom contexts (Polman & Scornavacco, 2022). Moreover, recent qualitative research on inquiry-based learning has demonstrated the value of examining participants' experiences, including the benefits, challenges, support systems, and contextual conditions that shape inquiry implementation (Bogador et al., 2024; Miasero, 2024). Rather than testing predetermined assumptions, the present study therefore provides an opportunity for themes and patterns to emerge directly from non-mathematics students' accounts and perspectives. Through this qualitative exploration, the study seeks to develop a richer and context-sensitive

understanding of how students experience inquiry, how they make meaning from inquiry-oriented activities, and how pedagogical, social, and contextual factors shape their movement from inquiry to learning.

PARTICIPANTS

The sample comprised **312 participants** drawn from the student population of NEMSU-Cantilan Campus. From this population, **295 students** were identified as the study participants, while **17 students** were purposively selected as key informants to provide detailed and relevant accounts of their experiences with inquiry-based learning (IBL). To ensure the collection of grounded and meaningful data, the key informants were purposefully selected based on criteria aligned with the objectives of the study, *From Inquiry to Learning: Exploring Non-Mathematics Students' Experiences with Inquiry-Based Learning*. Specifically, eligible key informants had to be officially enrolled as non-mathematics students at NEMSU-Cantilan Campus, have direct experience participating in inquiry-based learning activities as part of their classroom instruction, have sufficient exposure to inquiry-oriented tasks requiring questioning, investigation, analysis, collaboration, problem-solving, and reflection, be willing and able to describe their perceptions, experiences, challenges, and learning experiences associated with IBL, and represent different departments or academic programs within the campus to provide varied perspectives on how inquiry-based learning is experienced across non-mathematics disciplines. The selection of these key informants enabled the researchers to obtain diverse and in-depth accounts of students' experiences with IBL. Their participation was particularly important because the study seeks to understand inquiry-based learning not merely as an instructional strategy but as a learning experience shaped by students' engagement, interactions, challenges, perceptions, and access to teacher support. Through their firsthand accounts, the researchers were able to examine how non-mathematics students navigate inquiry tasks, collaborate with peers, respond to instructional challenges, and transform inquiry activities into meaningful learning experiences.

DATA COLLECTION PROCEDURE

Data were collected through semi-structured interviews and focus group discussions (FGDs), conducted through both face-to-face and telephone modalities to accommodate the availability and circumstances of the participants. Each interview session lasted approximately 20 to 40 minutes, providing a flexible yet structured setting in which the researcher could follow a predetermined set of guiding questions while allowing participants to elaborate on their experiences, perceptions, and insights regarding inquiry-based learning. The semi-structured format also enabled the researcher to ask follow-up and probing questions whenever responses required clarification or revealed significant experiences relevant to the study. Prior to each interview and FGD, informed consent was obtained from all participants, and permission to audio-record the sessions was secured. The recorded discussions were transcribed verbatim after each session to preserve the accuracy and richness of the participants' accounts. The researcher also maintained field and reflective notes to document relevant contextual observations, including participants' tone, pauses, expressions, hesitations, emotional responses, and other observable cues that could contribute to the interpretation of the qualitative data. These procedures were undertaken to ensure that the participants' experiences were captured comprehensively and accurately for subsequent thematic analysis.

Sampling Technique

A criterion-based purposive sampling strategy was employed for this study to intentionally select participants who possessed direct and relevant experience with inquiry-based learning (IBL) (Ahmad & Wilkins, 2024; Stratton, 2024). This non-probability approach was appropriate because the study aimed to obtain deep and contextually meaningful insights into how non-mathematics students experience, interpret, and respond to inquiry-based learning rather than achieve statistical generalization. Participants were selected based on predetermined criteria, particularly their enrollment in non-mathematics programs and direct participation in inquiry-oriented classroom activities within the International Baccalaureate (IB) setting. The inclusion of students from different departments and academic programs further enriched the data by providing diverse perspectives on engagement, collaboration, challenges, teacher support, and meaning-making during inquiry activities. Teachers and school administrators were also considered as supporting key informants because of their direct involvement in facilitating and supporting IBL practices. Thus, the criterion-based purposive sampling strategy ensured that participants had substantial and relevant experience with the phenomenon under investigation, enabling the researcher to generate rich, information-based data that were closely aligned with the research questions.

RESEARCH INSTRUMENT

A custom-designed, semi-structured interview guide served as the primary instrument for gathering qualitative data. The instrument focuses on two major areas: first, the experiences of non-mathematics students in engaging with inquiry-based learning, particularly their participation, interactions, learning processes, and perceived benefits; and second, the challenges, coping strategies, and contextual factors that influence their experiences and

transition from inquiry activities to meaningful learning. The interview questions were designed to elicit detailed narratives and personal perspectives that would provide a deeper understanding of how students experience and make meaning of inquiry-based learning. A simplified breakdown of the instrument's alignment with the study's objectives is detailed in Table 1.

Table 1. Overview of the Research Instrument

Research Objectives	Interview Questions
Explore the experiences of non-mathematics students in engaging with inquiry-based learning, including their participation, interactions, learning processes, and perceived benefits.	1. Can you describe your experiences when your teachers use inquiry-based learning in your classes? 2. How does inquiry-based learning influence your participation, interaction with classmates and teachers, and the way you approach questions, investigations, and problems? 3. In what ways has inquiry-based learning contributed to your understanding of your subjects and the development of skills such as critical thinking, collaboration, creativity, and independent learning?
Examine the challenges, coping strategies, and contextual factors that shape non-mathematics students' experiences and transition from inquiry activities to meaningful learning.	1. What challenges or difficulties have you encountered while participating in inquiry-based learning activities, and can you describe a situation when an inquiry activity became difficult or frustrating? 2. What strategies do you use to overcome these challenges, and how do your teachers, classmates, and learning environment support you during inquiry-based activities? 3. Looking back on your experiences, how would you describe the process of moving from inquiry activities to meaningful learning, and what improvements would you suggest for making inquiry-based learning more effective?

DATA ANALYSIS

Following data collection, the interview and focus group transcripts were analyzed using reflexive thematic analysis to identify and interpret patterns of meaning across the students' accounts. The analysis involved familiarization with the transcripts, generation of initial codes, development and refinement of themes, and interpretation of the final thematic patterns. These procedures are consistent with recent methodological guidance emphasizing the importance of reflexivity, methodological coherence, and clear development of themes in qualitative research (Braun & Clarke, 2024; Hole, 2024). The coding and theme development were guided by the study's two research objectives, focusing first on students' experiences, participation, interactions, learning processes, and perceived benefits of IBL, and second on their challenges, coping strategies, contextual support, and transition from inquiry activities to meaningful learning. The resulting themes were reviewed against the interview and focus group data and supported by relevant participant narratives to provide a contextualized understanding of how non-mathematics students experience and make meaning of inquiry-based learning. Recent methodological literature further emphasizes that reflexive thematic analysis should clearly demonstrate the connection between the research questions, analytic process, and interpretation of themes (Braun & Clarke, 2024).

Ethical Considerations

The study observed established ethical principles throughout the research process. Before data collection, all participants were informed about the study's purpose, procedures, and the voluntary nature of their participation.

Informed consent was obtained prior to the interviews and focus group discussions, including consent for audio recording. Participants were also informed of their right to decline to answer any question or withdraw from the study at any stage without penalty. To protect privacy and confidentiality, participant identities were replaced with codes or pseudonyms, while interview recordings, transcripts, and related research files were securely stored and accessed only for research purposes. These measures ensured that the rights, dignity, privacy, and welfare of the non-mathematics students participating in the study were protected throughout the research process.

RESULTS

Objective 1: Explore the experiences of non-mathematics students in engaging with inquiry-based learning, including their participation, interactions, learning processes, and perceived benefits.

Theme 1: Engaging and Student-Centered Learning Experiences through Inquiry-Based Learning

Students observe generally described their experiences with inquiry-based learning as interesting, engaging, meaningful, and helpful. Their responses indicate that IBL changes the classroom experience from simply receiving information from the teacher to actively participating in the learning process. Students particularly valued the opportunity to explore topics, ask questions, investigate problems, and discover answers independently. Several participants emphasized that they enjoyed IBL because they were able to find answers on their own rather than simply receiving information from their teachers. Participants' responses indicate that inquiry-based learning creates an engaging, active, and student-centered classroom experience. The most consistent experience was the opportunity to explore and discover knowledge independently, supported by active participation, collaboration, questioning, and hands-on activities. While some students initially experienced difficulty adjusting to the less teacher-directed approach, they also reported developing confidence, independence, and critical-thinking abilities "we get to discover answers on our own" and "I get to explore the topic and find answers instead of just listening to the teacher"

"engaging," and "less boring" compared with lessons that rely primarily on lectures. Participants explained that hands-on activities made the class "more engaging and less boring than purely listening to lectures."

"working with my classmates and sharing ideas," while another described participating in group activities and discussions.

"listening and following instructions, explore ideas, express my thoughts, and eventually become more confident and think critically."

"think critically and creatively to generate possible solutions/answers." However, the same participant explained that inquiry-based learning eventually allowed them to "explore ideas, express my thoughts, and eventually become more confident and think critically."

"at first, it can be difficult," while another explained that they initially found it challenging because they were accustomed to listening and following instructions.

Theme 2: Increased Participation, Communication, and Collaborative Problem-Solving

Students' responses indicate that inquiry-based learning fosters active participation, effective communication, collaboration, confidence, and independent problem-solving. It provides students with opportunities to express their ideas, interact with others, ask meaningful questions, and examine problems from different perspectives. Thus, inquiry-based learning not only increases students' participation in class but also contributes to the development of important skills that support them in becoming more confident, critical, and collaborative learners. It helps me become more active in class, work well with my classmates, and approach questions and problems with confidence." "It encourages me to participate, work with classmates, and ask more questions."

It makes me participate more and become more comfortable sharing my ideas." Another stated, "I feel more confident sharing my opinions and questions because our teachers create an environment where every idea is valued."

It also helped us communicate and work better with as a team."

Inquiry-based learning improved my participation by encouraging me to communicate with my classmates, share ideas and listen to their opinions."

I am even able to evaluate if my answer is correct by digging deeper on the question and looking at different sides of the problem instead of just guessing my answer."

analyze problems, gather information, and think critically before making conclusions."

Theme 3: Enhanced Learning and Holistic Skill Development Through Inquiry-Based Learning

Students' responses demonstrate that inquiry-based learning has made a positive contribution to both their academic understanding and personal skill development. The most common response was that students understand lessons better when they are actively involved in discovering concepts, exploring ideas, and solving problems. Inquiry-based learning develops several interconnected skills. Critical thinking is strengthened as students analyze information and evaluate possible solutions. Collaboration develops as students work with classmates and

encounter different perspectives. Creativity is encouraged through exploration and the development of different approaches to solving problems. Finally, independent learning and confidence are developed as students take responsibility for finding information, completing tasks, and solving problems on their own.

“It helps them understand lessons better by allowing them to discover ideas and actively involved in learning on their own.”

“It has strengthened my critical thinking skills by encouraging me to evaluate information and solve problems.”

“It helped us understand lessons better and actively involved in finding answers. It also improved critical thinking, creativity, and ability to solve problems independently.”

“Inquiry-based learning helps me understand the subjects by encouraging me to think critically, explore ideas, collaborate with my classmates, and understand how we arrive at our answer.”

“It even taught me how to collaborate with others with different ideas and process of solving problems.”

“Inquiry-based learning helps me understand the subjects by encouraging me to think critically, explore ideas, collaborate with my classmates...”

“It has also taught me to become a more independent learner by taking responsibility for completing tasks and seeking information on my own.”

Objective 1: Examine the challenges, coping strategies, and contextual factors that shape non-mathematics students’ experiences and transition from inquiry activities to meaningful learning.

Theme 1: Challenges in Navigating Inquiry-Based Learning

Students’ responses reveal that the main challenge encountered in inquiry-based learning is difficulty and uncertainty in understanding questions, instructions, and how to begin a task. Several participants expressed frustration when they could not immediately find the correct answer, encountered unfamiliar or challenging questions, or were unsure about where to start. Limited time and unclear instructions also made some activities more difficult. In addition, some participants experienced challenges in finding sufficient and reliable information and resources, while others encountered disagreements within their groups when deciding on an answer or solution. These difficulties sometimes resulted in frustration, particularly when students were accustomed to receiving step-by-step instructions. However, some participants addressed these challenges by asking teachers for clarification, working with classmates, spending additional time searching for information, and carefully evaluating possible answers. Overall, the responses suggest that while inquiry-based learning can be challenging, these difficulties are often related to students’ uncertainty and the need to independently navigate complex tasks, which may also provide opportunities to develop persistence, problem-solving, and collaborative skills.

“They sometimes find difficult questions and activities challenging. Limited time can also make the activities harder.”

“I sometimes find the activities challenging, especially when the questions are difficult. I overcome them by asking my teacher and working with my classmates.”

“Sometimes, I find the activities difficult, especially when I don’t understand what I’m supposed to do. There are times when I feel frustrated because I don’t know where to begin.”

“Sometimes, I find inquiry-based activities difficult when I do not know where to start or when the questions are challenging. It can be frustrating when I cannot immediately find the answer.”

“One challenge I encountered was finding enough information and resources when conducting an investigation. Since some resources are not always easily available, our group had to spend extra time searching for reliable information. There were also times when group members had different opinions, making it difficult to agree on a common solution. For example, during a community-based research activity, our group struggled to organize and analyze the information we gathered, which caused some frustration.”

“Sometimes, activities are confusing, especially when and where to start. It could also be frustrating when I immediately can’t find the right answer.”

“One of the problems I encountered using inquiry-based learning is uncertainty, because there are times when I find it hard to know where to start with the problem, and I felt frustrated when I can’t even evaluate and find the right answers to the problem.”

“One challenge I experienced was being asked an unfamiliar question. I sometimes needed more time to think of an answer, which made me feel frustrated.”

Theme 2: Seeking Support and Using Collaborative Strategies to Overcome Challenges

Students’ responses reveal that they overcome challenges in inquiry-based learning through asking for guidance, collaborating with classmates, reviewing instructions and learning materials, conducting research, and trying different approaches to problems. Many participants emphasized the importance of seeking help from teachers and classmates when they encounter difficult questions or are unsure how to proceed. Others mentioned rereading

instructions, asking questions for clarification, discussing ideas, and searching for additional information to better understand the task. Group work was also identified as an effective strategy because classmates can share different ideas, processes, and solutions that help learners understand the activity and apply new approaches independently. Teachers also play an important role by providing guidance, feedback, encouragement, examples, and clarification when students experience difficulties

“They ask questions, review the lesson, and work with my classmates. Teachers provide guidance and encouragement when they need help.”

“I use teamwork, discussion, research, and asking questions to overcome challenges during inquiry-based activities.”

“I reread the instructions, ask my classmates for help, and ask my teacher for guidance when needed.”

“I overcome these challenges by asking my teacher or classmates for help, researching, and trying different approaches.”

“I ask my professors and classmates for help, review learning materials, and try different approaches. Supportive professors and classmates help me overcome difficulties.”

“When this happens, I ask my teacher or classmates for help. I also try to understand the instructions again and find another way to solve the problem.”

“To overcome these challenges, I try to communicate well with my group members and divide tasks fairly. I ask questions whenever I need clarification and use available learning materials to support my research. My teachers provide guidance, feedback, and encouragement whenever we encounter difficulties. My classmates also help by sharing ideas and working cooperatively.”

“When asking for clarification, I tried different ways to solve the problem. Working with others also helped me understand the activity better.”

“When these challenges happened, I overcome it by asking guidance through my classmates and teachers with their different processes and ideas on how they deal with the problem so I can also apply it on my own. I also seek for more information so I can evaluate if I am on the right direction of answering the problem.”

“To overcome these challenges, I stay calm and think carefully. When I need help, I ask my teacher or classmates and listen to their ideas.”

Theme 3: Meaningful and Contextualized Learning Through Guided Inquiry

The participants' responses reveal that inquiry-based learning becomes more meaningful when students are given opportunities to ask questions, explore ideas, discover answers, and connect their learning to real-life situations. Participants emphasized that understanding is strengthened when they can relate what they discover to the lesson and to experiences in their daily lives, rather than simply memorizing information. They also highlighted the importance of clear instructions, sufficient time, teacher guidance, relevant learning activities, adequate resources, and opportunities for collaboration and discussion. Some participants explained that they initially feel confused or uncertain but gradually gain understanding through questioning, researching, discussing, and reflecting on their findings. The participants also suggested that teachers provide a clear starting point and a summary or explanation at the end of an activity so students can connect their different approaches and answers to the actual lesson. The responses indicate that inquiry-based learning is most effective when students are given enough freedom to discover knowledge while receiving appropriate guidance and support from teachers, making learning more meaningful, practical, and connected to real-life experiences.

“I usually start by being confused, then I ask questions, discuss, and try to find the answer. I learn better when I discover the answer myself. I suggest giving clear instructions, enough time, and activities related to real-life situations.”

“I think inquiry activities become meaningful when students are given enough time, clear instructions, guidance, and opportunities to work collaboratively.”

“Inquiry activities become meaningful when I can connect them to real-life situations. Professors can improve them by giving clear instructions, guidance, enough time, and relevant activities.”

“I think inquiry activities become meaningful when I can relate what I learned to real-life situations. It would be better if the teacher gives clear instructions, enough time, and guidance when needed.”

“For me, meaningful learning happens after exploring, asking questions, and understanding the topic. I think inquiry-based learning can be more effective if teachers provide clear instructions and enough guidance during the activities.”

“The process becomes meaningful when we fully understand why we got an answer, not just what the answer is. Clearer instructions, enough time, and guidance from the teacher/instructor would make inquiry-based learning more effective.”

“Inquiry activities become meaningful when students understand what they discovered and connect it to the lesson. I suggest using simple, practical, and real-life problems and giving students enough time to explore and discuss their answers.”

“Things finally make sense when the teacher wraps up the lesson and explains how our different ways of answering the problems connect to the real topic and with it, we can also reflect and evaluate if our answers are correct. To make it better, teachers should give us a clearer starting point so we can maximize the time we allotted during the discovery of our answer process.”

DISCUSSION

The results of this investigation highlight the active, collaborative, and student-centered nature of inquiry-based learning among non-mathematics students. Rather than functioning as a purely teacher-directed approach, inquiry-based learning allows students to explore topics, ask questions, investigate problems, and discover answers through direct participation. The participants' descriptions of the activities as “engaging,” “meaningful,” and “less boring” demonstrate that inquiry creates a learning environment in which students become more involved in constructing their own understanding. Their experiences further suggest that hands-on activities, group discussions, and opportunities to express ideas contribute to greater confidence and engagement in the learning process. This finding is supported by Rabbani et al. (2025), who found that inquiry-based learning encouraged students to communicate, collaborate, and actively engage with concepts through exploration. Similarly, Gabriento (2025) reported that inquiry-based learning contributes to the development of 21st-century skills and supports more student-centered learning experiences.

The findings also establish that inquiry-based learning strengthens communication, collaboration, critical thinking, creativity, and independent learning. Students reported becoming more comfortable sharing their ideas, working with classmates, analyzing problems, gathering information, and considering different perspectives before reaching conclusions. This indicates that inquiry-based learning extends beyond content acquisition by developing students' ability to reason and interact effectively with others. Recent evidence from Rabbani et al. (2025) demonstrates that inquiry-based learning can foster the development of communication, collaboration, critical thinking, and creativity among students. Likewise, Afikah et al. (2025) found that collaborative inquiry activities supported students' critical thinking and communication skills through guided research and collaborative learning. These findings reinforce the participants' view that inquiry provides opportunities not only to discover knowledge but also to exchange ideas, evaluate information, and develop solutions collaboratively. Recent research by Chang (2023) found that scaffolding inquiry-based instruction can improve learning and problem-solving among non-engineering students, although some learners may still struggle with complicated problems. Similarly, Sasse et al. (2024) emphasized that the effectiveness of inquiry learning is influenced by the amount and timing of teacher guidance provided to students. These findings support the participants' experiences and demonstrate that student autonomy should be accompanied by appropriate instructional structure.

A significant finding is the students' reliance on teacher guidance and peer collaboration as coping mechanisms when difficulties arise. Participants described rereading instructions, asking questions, seeking clarification from teachers and classmates, researching additional information, discussing possible solutions, and trying alternative approaches. This demonstrates that effective inquiry does not necessarily mean complete independence from the teacher. Instead, students benefit from guided support that enables them to gradually develop the confidence and skills necessary to work independently. Sasse et al. (2024) highlighted the importance of responsive teacher guidance and on-the-fly scaffolding in inquiry learning, particularly when students encounter difficulties during investigation. In addition, Afikah et al. (2025) demonstrated that teacher-guided collaborative inquiry can support both analytical reasoning and communication. Thus, teacher feedback, encouragement, clarification, and appropriate questioning function as important forms of scaffolding throughout the inquiry process.

The findings further indicate that inquiry-based learning becomes most meaningful when students can connect their discoveries to real-life situations and the actual lesson. Participants emphasized the value of practical and relevant activities, sufficient time for exploration and discussion, clear instructions, and opportunities to reflect on their findings. The students' desire for teachers to provide a clear starting point and conclude activities with an explanation or synthesis suggests that inquiry is most effective when exploration is followed by meaningful reflection and connection to formal concepts. This finding is consistent with recent research showing that inquiry-based learning can strengthen students' conceptual understanding when learners actively investigate and reflect on learning experiences. Gabriento (2025) further emphasized the importance of structured inquiry strategies in developing 21st-century competencies, while Sasse et al. (2024) highlighted the value of appropriate teacher guidance in helping students successfully navigate inquiry processes. This transition from discovery to conceptual understanding allows students to recognize not only what the answer is but also why the answer is appropriate.

Finally, the findings demonstrate that inquiry-based learning provides non-mathematics students with a meaningful pathway from active participation to deeper understanding and skill development. Although students may initially experience uncertainty and frustration, these challenges can be addressed through clear instructional guidance, adequate time, collaboration, relevant resources, and opportunities for reflection. Recent research by Dewi et al. (2025) found that inquiry-based learning has a significant positive influence on students' critical thinking skills, particularly through processes involving analysis, inference, and evaluation. Likewise, Gabriento

(2025) found that inquiry-based learning is associated with the development of 21st-century skills and recommended structured inquiry strategies to maximize its benefits. Therefore, the evidence suggests that the effectiveness of inquiry-based learning depends not simply on giving students freedom to explore, but on creating a supportive environment where exploration is appropriately guided. Ultimately, inquiry-based learning transforms the classroom into a space where students can question, investigate, collaborate, create, reflect, and independently construct meaningful knowledge.

CONCLUSION

This research establishes that inquiry-based learning among non-mathematics students is an active, collaborative, and student-centered approach that contributes meaningfully to students' understanding and skill development. Rather than relying solely on teacher-directed instruction, students become actively involved in questioning, exploring, investigating, and discovering answers. The findings demonstrate that this approach strengthens critical thinking, communication, collaboration, creativity, confidence, and independent learning. By highlighting students' experiences, participation, interactions, and perceived benefits, the study fulfills its primary objective of exploring how inquiry-based learning supports meaningful and active learning among non-mathematics students. However, these challenges were addressed through teacher guidance, peer collaboration, questioning, research, reviewing instructions, and trying alternative approaches. This demonstrates that effective inquiry does not require students to learn completely independently; rather, their independence develops through guided exploration, collaboration, and supportive instructional scaffolding.

The evidence indicates that inquiry-based learning becomes most meaningful when students are provided with clear instructions, sufficient time, relevant resources, real-life learning experiences, opportunities for collaboration, and appropriate teacher guidance. The findings suggest that students benefit when teachers provide a clear starting point while still allowing them sufficient freedom to explore and construct knowledge. Reflection and teacher synthesis at the end of inquiry activities are likewise important in helping students connect their discoveries to formal concepts and understand not only what the answer is but why it is appropriate. This investigation provides an evidence-based understanding of how inquiry-based learning can support deeper understanding, active participation, and holistic skill development among non-mathematics students. It confirms that successful inquiry depends not simply on giving students freedom to discover, but on creating a balanced learning environment where independence is supported by guidance, collaboration, adequate resources, and meaningful real-world connections..

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