

Pre-Service Teachers' Beliefs, Difficulties and Practices Toward Inquiry-Based Learning in Mathematics: A Mixed-Method Approach

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Abstract

This study explored pre-service teachers' (PSTs) beliefs, perceived difficulties, and classroom practices toward inquiry-based learning (IBL) in mathematics at a private university in Davao City, Philippines. Employing a convergent mixed-methods design, quantitative data were collected from 92 PSTs via a validated survey (Cronbach's $\alpha = 0.872-0.885$), assessing beliefs, difficulties, and practices on a 5-point Likert scale. Qualitative data came from semi-structured interviews and focus groups with 15 purposively selected PSTs. Results showed strong beliefs ($M = 4.27$, $SD = 0.48$) in IBL's effectiveness for critical thinking and engagement, but high perceived difficulties ($M = 4.35$, $SD = 0.44$) from time constraints, resource limitations, and student readiness. Practices scored moderately ($M = 3.83$, $SD = 0.54$), revealing a theory-practice gap confirmed qualitatively through themes like "Deep, Active Learning," "Constraints and Barriers," and "Teacher as Facilitator." Quantitative-statistical trends aligned with qualitative narratives, triangulating that PSTs value IBL theoretically but struggle with practical execution under curriculum pressures. Conclusions highlight the need for teacher education programs to bridge this gap through targeted professional development, IBL-compatible lesson design, scaffolded inquiry training, and

institutionalized mentorship. Recommendations emphasize embedding inquiry cycles (orienting, planning, investigating, concluding) into curricula and using real-world problems to foster curiosity. This study contributes Philippine-context evidence supporting SDG 4 (quality education), informing pre-service training for student-centered mathematics pedagogy.

Keywords: Inquiry-based learning, pre-service teachers, mathematics, mixed methods, Davao City

Introduction

Inquiry-Based Learning (IBL) is a pedagogical approach that shifts the classroom focus from rote memorization to active discovery and higher-order thinking. In mathematics education, IBL is particularly effective as it promotes logical reasoning and long-term retention through exploration. Central to the success of this pedagogical shift is teaching self-efficacy, the belief in one's ability to execute effective instruction even in challenging classroom environments (Bandura, 1997; Tschannen-Moran & Hoy, 2001).

Despite these documented benefits, the transition to IBL remains difficult for many educators. Pre-service teachers (PSTs) often face a "theory-practice gap," where academic training in student-centered methods conflicts with the traditional, teacher-centered realities of the classroom (Gholam, 2019). Systemic hurdles such as rigid curricula, time constraints, and a lack of instructional resources further complicate the adoption of inquiry-based practices (Ramnarain & Hlatswayo, 2018).

The framework of this study is grounded in several key psychological and educational theories. The Theory of Planned Behavior suggests that a teacher's intention to use IBL is dictated by their attitudes and perceived behavioral control (Ajzen, 1991). This is complemented by Social Cognitive Theory, which emphasizes that a teacher's confidence is built through mastery experiences and social modeling (Bandura, 1986). Furthermore, Constructivist Learning Theory posits that learning is an active process of social negotiation, a concept that underpins the essence of inquiry (Vygotsky et al., 1978).

Current research indicates that while PSTs generally hold positive beliefs about the utility of IBL, their actual classroom implementation is often inconsistent (Voet & De Wever, 2019; Yıldız-Feyzioğlu & Demirci, 2021). In the Philippine context, there is a pressing need to understand how these future educators navigate such challenges to meet the standards of quality education (Friesen & Scott, 2013). This study utilizes a convergent mixed-methods design to explore the relationship between the beliefs, practices, and perceived difficulties of PSTs at a private university in Davao City (Creswell & Clark, 2017). By identifying these factors, teacher education programs can better

equip PSTs to foster critical thinking and inquiry in the modern mathematics classroom.

Methods

The research respondents and research instruments are outlined in this section. Also, the research design and the procedures taken to process and analyze the collected data are all presented in this section.

Research Respondents

The study was conducted at a private university in Davao City. For the quantitative phase, 92 pre-service teachers (PSTs) were selected via stratified random sampling to ensure representation across academic programs. For the qualitative phase, 15 PSTs, representing both Mathematics and Generalist majors, were chosen through purposive sampling. These participants were selected based on their direct exposure to Inquiry-Based Learning (IBL) during their teaching internships.

Inclusion Criteria

To ensure the data reflected relevant pedagogical experiences, participants were required to meet the following criteria:

- **Enrollment Status:** Currently enrolled as fourth-year Bachelor of Secondary Education students majoring in Mathematics or as Bachelor of Elementary Education - Generalists.
- **Clinical Experience:** Must have completed or be currently engaged in their teaching internship (Practice Teaching) during the 2024-2025 academic year.
- **Curriculum Exposure:** Must have completed professional education courses specifically covering student-centered and Inquiry-Based Learning (IBL) strategies.
- **Academic Standing:** Must be officially cleared by the College of Teacher Education to perform classroom instruction.

Exclusion Criteria

To maintain the focus on IBL in the Mathematics context, the following were excluded:

- **Non-Teaching Interns:** Students enrolled in the education program but are not yet deployed for field study or internship.
- **Incomplete Participation:** Students who were unable to attend the full duration of the Focus Group Discussions (FGD) or In-Depth Interviews (IDI) due to scheduling conflicts.
- **Irrelevant Specializations:** Pre-service teachers from non-related majors (e.g., Physical Education or TLE) who do not utilize the specific Mathematics IBL framework.

Research Instruments

The quantitative phase utilized a modified survey questionnaire adapted from Ramnarain and Hlatswayo (2018), specifically designed to assess pre-service teachers' (PSTs) beliefs, perceived difficulties, and classroom practices. The instrument employed a 5-point Likert scale, with responses ranging from "Strongly Disagree" (1) to "Strongly Agree" (5). Scores were interpreted as follows: negative attitudes/practices ranged from 1.0 to 2.4, neutral responses from 2.5 to 3.4, and positive attitudes/high practices from 3.5 to 5.0.

To ensure the instrument's reliability and validity in the Philippine context, it underwent rigorous expert validation followed by pilot testing. The survey demonstrated high internal consistency, yielding Cronbach's alpha values of 0.885, 0.872, and 0.883 across the different indicators. These values confirm the instrument's effectiveness in obtaining comprehensive and reliable full-scale data (Tavakol & Dennick, 2011).

The qualitative phase was carried out using a semi-structured interview guide designed to supplement the survey by providing a richer understanding of why PSTs hold specific beliefs and how those beliefs influence their teaching practices. Each session—conducted through either in-depth interviews (IDI) or focus group discussions (FGD) started with a primary question for each research objective, followed by four probing questions to explore participants' perceptions and experiences. This instrument allowed the researchers to probe deeper into the statistical trends identified in the quantitative phase. The interview guide was developed and verified by the researchers and subjected to expert validation to confirm the alignment of all items with the research objectives.

Design and Procedure

This study employed a convergent mixed-methods design, which allowed for the simultaneous collection and analysis of quantitative and qualitative data to provide a comprehensive understanding of the research problem (Creswell & Clark, 2017). The integration of both data types facilitated the triangulation of statistical trends with personal narrative experiences.

Following institutional approval and the acquisition of informed consent, the modified survey was administered to 92 pre-service teachers (PSTs). Data were collected electronically to ensure accuracy. The results were then analyzed using descriptive statistics, specifically mean and standard deviation, to identify broad patterns in teacher beliefs, practices, and difficulties.

Concurrent with the quantitative analysis, semi-structured in-depth interviews (IDI) and focus group discussions (FGD) were conducted with 15

purposely selected PSTs. These sessions were audio-recorded and transcribed verbatim. The qualitative data underwent thematic analysis using Creswell's procedural spirals, which involved coding, categorizing, and theme development to extract deeper meaning from the participants' classroom experiences.

In the final stage, the findings from both strands were merged. The quantitative results provided the general landscape of IBL adoption, while the qualitative insights offered explanations for the statistical discrepancies observed. This integration allowed the researchers to draw well-substantiated conclusions regarding the "theory-practice gap" in mathematics education.

Results and Discussion

This section shows the quantitative and qualitative data collected regarding the responses of the pre-service teachers' beliefs, difficulties, and practices toward inquiry-based learning.

Quantitative Results

Table 1 summarizes the pre-service teachers' responses concerning their beliefs, perceived challenges, and classroom practices in the use of Inquiry-Based Learning (IBL) and overall attitude. The interpretation of results used a 5-point Likert scale, in which a higher score represented greater agreement or a more positive perception.

Table 1: Level of Beliefs, Difficulties, and Practices

Indicators	<i>M</i>	<i>SD</i>
Beliefs	4.27	0.48
Difficulties	4.35	0.44
Practice	3.83	0.54
Overall	4.15	0.42

Pre-service teachers demonstrated high belief scores ($M = 4.27$, $SD = 0.48$), indicating a strong conviction that IBL is more effective than traditional methods for fostering student engagement and critical thinking. These results suggest that PSTs are theoretically aligned with student-centered approaches, viewing IBL as a tool for deeper knowledge construction and long-term retention. This positivity aligns with Social Cognitive Theory, where high outcome expectancy, the belief that a method will succeed, serves as a primary motivator for pedagogical adoption (Bandura, 1986).

The highest mean score was recorded for perceived difficulties ($M = 4.35$, $SD = 0.44$), reflecting overwhelming agreement on the barriers to IBL implementation. The low standard deviation (0.44) indicates a strong consensus among respondents regarding these challenges, which primarily include time constraints, curriculum alignment, and student readiness. According to the Theory of Planned Behavior, these high levels of perceived

difficulty can hinder the conversion of positive intentions into actual classroom behavior (Ajzen, 1991).

Classroom practice yielded the lowest mean score ($M = 3.83$, $SD = 0.54$), revealing a significant gap between the participants' strong theoretical beliefs and their actual implementation. While the scores still fall within the positive range, the increased variability ($SD = 0.54$) suggests diverse levels of confidence among PSTs. This discrepancy indicates that while future educators value IBL, they often lack the practical experience or "mastery experiences" necessary to navigate complex classroom management and lesson planning (Adu-Gyamfi, 2020; Gholam, 2019).

Despite the recognized challenges, the overall attitude toward IBL remains high ($M = 4.15$, $SD = 0.42$). This suggests that PSTs remain optimistic about the potential of IBL to foster critical thinking and real-world application. However, the data underscores a critical need for teacher education programs to move beyond theoretical advocacy and provide structured mentorship to help PSTs overcome practical barriers (Fisher et al., 2016).

In summary, the results show that although pre-service teachers support IBL enthusiastically, they need considerable support to carry it out. This implies that teacher education programs should not just stop advocating for positive attitudes toward IBL but should also create opportunities with mentorship and structure to help pre-service teachers confront the practical realities of IBL. In this process, they can narrow the gap between recognizing the worth of IBL and using it confidently and effectively in the classroom.

Qualitative Results

The qualitative phase, involving in-depth interviews (IDI) and focus group discussions (FGD), provided a nuanced understanding of the pre-service teachers' (PSTs) experiences. The following six themes emerged, illustrating the interplay between their theoretical beliefs and the practical realities of the classroom.

Table 2: Perceptions of Pre-Service Teachers' Beliefs, Difficulties, and Practices

Indicators	Theme	Core Idea
Beliefs	Deep, Active Learning	<ul style="list-style-type: none"> ● Student-centered learning ● Encourages critical thinking and independent discovery ● Construction of students' own knowledge
	Real World Application	<ul style="list-style-type: none"> ● Connection of lessons to daily life ● Improves long-term retention ● Meaningful learning
	Growth and Engagement	<ul style="list-style-type: none"> ● Progress being evident through assessments and application ● Students' engagement and willingness to participate

Difficulties	Constraints and Barriers	<ul style="list-style-type: none"> • Time limitations • Varying level of learners • Students' unpreparedness and lack of interest
	Questioning and Curiosity	<ul style="list-style-type: none"> • Students ask questions • Deeper understanding built through questioning • Curiosity leads to exploration and self-directed learning
Practices	Teacher as a Facilitator	<ul style="list-style-type: none"> • Interactive process of learning • Teachers guide students' learning

Deep, Active Learning. PSTs characterized IBL as a transformative, student-centered approach that shifts learners from passive recipients to active knowledge constructors. Participants emphasized that this method grants students the freedom to express their ideas and puts the student in charge. The core idea of this theme is about facilitating independent discovery and critical thinking over rote memorization.

As some of the participants stated,

Inquiry-based learning is kanang student-centered siya nga approach. It is more on sa studyante jud naga tawag ana. Naga-ikot ang learning, teaching and learning process sa isa ka room setting, and then mas gina-hatagan ug kanang freedom ang bata nga mu-speak sa iyahang ideas and informations na iyahang nahibal-an.

— Inquiry-based learning is a student-centered approach. It really puts the student in charge. The entire teaching and learning process in a classroom setting revolves around the student, and they are given more freedom to express their ideas and the information they've learned. (P2).

I think po ang inquiry-based learning is more on student-centered rather than teacher-centered and I think inquiry-based learning is naga, mas more on siya engaging and mas naga hatag siya or naga, naga, mas, uhm, mas maka think critically ang mga students than tagaan lang sila'g mga information. So, they are more on active learners than passive learners.

— I think inquiry-based learning is more student-centered rather than teacher-centered. I also believe inquiry-based learning is more engaging, and it allows students to think more critically instead of just being given information. So, they are more active learners than passive learners. (P1).

It then results in students' ability to construct their knowledge,

Mao pud na akoang gina-apply karon sa akong mga students and inquiry-based learning nga sila jud ang mag construct sa ilang own learning jud.

— That's also what I'm applying with my students now, inquiry-based learning, where they really construct their own learning. (P6).

These data show that IBL is a student-centered learning approach where students are encouraged to learn and engage, thus fostering independent discovery actively. Furthermore, the quantitative data support this perception with high belief scores ($\bar{x} = 4.27$) that symbolize enthusiasm. It results in deep learning as students practice their critical thinking skills, which hone the students' ability to construct their own knowledge and learning.

Real World Application. A recurring theme was the capacity of IBL to bridge the gap between abstract mathematical concepts and daily life. By investigating real-life scenarios, PSTs believe that students achieve better long-term retention because they discover the knowledge rather than being spoon-fed. The core idea of this theme is meaningful learning through contextual relevance.

As stated by a participant,

My current belief and understanding of inquiry-based learning in the classroom, para sakoa, it is student-centered and, as we say it, it is more on investigating in real life scenarios, where you incorporate real life scenarios in the classroom setting.

— My current belief and understanding of inquiry-based learning in the classroom is that, for me, it's student-centered. As we say, it's more about investigating real-life scenarios, where you incorporate these situations into the classroom setting. (P4).

This idea was further supported by a participant stating,

Rather than atoa lang jud silang tudluan or i-hungit lang gud tanan sa ilaha, makatuon sila pero dali lang mawala sa ilaha rather than sila gud mag explore, sila maka discover kay makatuon and dili sila makalimot kay sila man nakadiscovers ana na knowledge.

— Rather than us just teaching them or spoon-feeding them everything, they might learn, but it will quickly fade from their memory. Instead, if they truly explore and discover things themselves, they will learn, and they won't forget because they are the ones who discovered that knowledge. (P1).

Because of what was mentioned previously by the other participants, the effectiveness of IBL now leads to meaningful learning and experience for the students, as mentioned,

For example, kuntahay like sa real-life situation, 'what if kani inyong paliton, ing-ana, ing-ana?'... so murag pagkahuman ato kay murag diha na kung ma ready na gani murag naay silag murag na learn sa motivation pa lang, sa application. So dira na murag I introduce sa teacher ang unsa jud to ang specific na lessons, so mao to sya mahimo syag effective for the students.

— For example, in a real-life situation, we could ask, 'What if you were to buy this, and it worked like this or that?' After that, once they're ready, they'll have already learned something just from the motivation and application of the idea. That's when the teacher can introduce the specific lessons, making it really effective for the students. (P3).

These responses are just a few that show how IBL's connection to real-life context contributes to its effectiveness. Gholam (2019) then corroborates this belief, highlighting that contextual relevance is important regarding student engagement and retention by IBL in mathematics and any other field. In addition, Vishnubhotla et al. (2022) support this further by saying that the real-world applications of IBL further strengthen cognitive frameworks, which supplement an individual's problem-solving skills. Furthermore, despite the pre-service teachers' high value of this approach, which reflects a strong belief, this theme indicates a gap in practice because, as emphasized by Fisher et al. (2016), designing such lessons requires skills that new teachers may be lacking. Nonetheless, participants still believe that learning is made fun and easier if lessons are related to real-life situations where students can relate and make the lesson enjoyable. As meaningful learning takes place, it causes long-term retention of what the students learn.

Growth and Engagement. Success in IBL was defined not just by correct answers, but by visible progress in student participation and willingness to try their best despite mistakes. PSTs noted that true growth is evident when students are truly engaged and understand the underlying mathematical processes. With a core idea of sustained interest and process-oriented progress.

As stated by a participant regarding students' progress,

Mas successful ang inquiry-based learning if naay...if sa naay natunan ang bata and makita nimo sa ilahang assessment. Like for example, like sa performance task nila, is didto nimo makitan if katong imohang approach ba is successful or not

kay through assessment kay maka-reflect man ka didto, 'Ay nakatuon sila', 'Ay wala sila nakatuon.

— You'll know Inquiry-Based Learning is more successful if the children actually learned something, and you can see it in their assessments. For example, in their performance tasks, that's where you'll see if your approach was successful or not. Through assessment, you can reflect and say, 'Ah, they learned,' or 'Ah, they didn't learn.' (P1).

Another statement by a participant also shows students' growth through their engagement and willingness to participate, as mentioned.

I can say if successful ang IBL is that if my students are really engaged, like dili lang kana ganing pag mag question kay murag at some point ako pud mutubag sa akong questions and aside from that not just ano kanang dili lang ma memorize nila ang formula but also the process kanang ma retain jud sa ilaha, and they would try their best na mag unsay tawag ana ha, kanang they'll try their best na mag answer despite na magkamali sila.

— I can say IBL is successful if my students are truly engaged. It's not just when I ask questions and end up answering them myself. Besides that, it's not about them just memorizing the formula, but also understanding and retaining the process. They would also try their best to answer, even if they make mistakes. (P14).

There are various ways to identify IBL's success. However, these statements imply that IBL's success is also evident through students' assessment, application of lessons, and participation. Despite the possibility of the students getting an incorrect answer, their willingness to try and engage is clear progress in their learning. This confirms findings from Lazonder and Harmsen (2018) that IBL gets students involved and achieves results in positive inquiry environments. Kidwell (2019) also noted that IBL's focus on exploration increases engagement, allowing for sustained learning outcomes. This links with the positive overall attitude ($\bar{x} = 4.15$), but also connects with the gap in practice, since it requires more advanced skills to keep students engaged in front of all obstacles, as pointed out by Gholam (2019). It only affirms the study of Ramnarain & Hlatswayo (2018) that in teacher education, hands-on experience is needed for sustaining student engagement as well as demonstrating the benefits of IBL. As a result, learning is fostered, and retention of the lesson is also apparent as they move forward.

Constraints and Barriers. This theme aligns with the high quantitative difficulty scores. PSTs identified significant systemic hurdles, primarily time limitations and student readiness. Many felt that the 45-minute class duration is insufficient for deep inquiry. The core idea of this theme is about the tension between pedagogical ideals and curriculum schedules.

Stated by one of the participants,

I think IBL is uhm unsa tawag ana, time consuming gud. Time consuming sya given the fact na we only have 45 mins na mag klase, and then yun nga. I think its effective, ideally mao dapat na, but uhm, I don't think pwede sya gamiton always.

— I think IBL is, um, what do you call it, time-consuming. It's time-consuming given the fact that we only have 45 minutes for class, and well, there's that. I think it's effective, ideally it should be the standard, but, um, I don't think it can always be used. (P10).

Aside from restrictions on time, varying levels of learners hinder pre-service teachers in implementing IBL, as expressed by a participant.

Actually, dili kaayo ni ma-apply no sa grade 1, legit, dili kaayo siya applicable kaayo inquiry-based sa grade 1 ug grade 2 kay grabe pud kayo.

— You know, this actually isn't very applicable for Grade 1, seriously. Inquiry-based learning isn't really suitable for Grade 1 and Grade 2 because it's just too much. (P8).

As students have varying levels, their readiness and interest also serve as constraints and barriers to IBL's success. Pointed out by a participant

Sa akooa, inquiry-based... to catch their attention first, so unsaon nimo pag connect sa imong topic, ug sa imohang, gikan sa imong motivation, kay usually and every time ang mga bata jud nako sa grade 1 is dili jud siya interested sa math so... dili kaayo siya ing-ana ka effective ang inquiry-based sa math na subject.

— For me, with inquiry-based learning... you need to catch their attention first. So, it's about how you connect your topic and your motivation. Because usually, and every time, my Grade 1 students are just not interested in math. So, inquiry-based learning isn't that effective for math as a subject. (P8).

Time constraints were prominent, with IBL requiring 60-90 minutes per lesson versus 45-minute classes (e.g., 20 minutes exploration, 30 minutes guided inquiry, 20 minutes reflection). Effective solutions include modular

IBL (e.g., micro-inquiries in 10-minute segments) and hybrid approaches blending with direct instruction to fit schedules. These sentiments mentioned by the pre-service teachers are the reality of how difficult it is to implement IBL in a classroom setting where each student and grade level are unique. This matches the greatest quantitative mean in terms of difficulty ($\bar{x} = 4.35$).

Besides that, Lehtinen et al. (2019) affirm that these difficulties faced by participants, such as different learner readiness, if not considered while adapting strategies, complicate IBL. For low-level students (e.g., Grades 1-2 or those with low readiness), adapt IBL via scaffolded inquiry: start with structured prompts (e.g., visual aids, concrete manipulatives), progress to semi-guided questions, and use peer buddies for support. This builds readiness without full open exploration. Also, not only does this theme justify the score for high difficulties, but it also relates to lesser practice confidence ($\bar{x} = 3.83$) compared to its belief score, reflecting that novices are sensitive to practical barriers, as confirmed by the study of Minner et al. (2010). Even so, IBL is still believed to be an effective approach, but as a pre-service teacher, knowing how and when to implement it is still the best strategy in teaching the students that leads to successful learning.

Questioning and Curiosity. Curiosity was viewed as the engine of IBL, where the art of questioning leads toward self-directed learning. PSTs encouraged repetitive questioning to clarify misconceptions and build a deeper understanding. Therefore, stimulating inquiry that cycles through learners' curiosity.

A participant mentioned,

I think if ma build nato ang curiosity sa bata then IBL is very effective gyud.

— I think if we can build a child's curiosity, then Inquiry-Based Learning (IBL) is truly very effective. (P10).

This curiosity led students to ask more questions that help them build a deeper understanding, where one participant stated,

So even if mali, or unsa ba, miskan balik-balik, at least, na-clarify, at least nadungagan ilang knowledge.

— So even if they're wrong, or whatever the case, or even if we repeat ourselves, at least it gets clarified, and their knowledge increases. (P7).

Since students have now sparked their curiosity about the lesson, they begin to explore and direct their learning.

Ma ano jud nimo na successful ang IBL no, kay kanang ang ano ang curiosity sa bata... tungod pud anang IBL no, mag

engage ang mga bata then turns na they will actively muconstruct og knowledge rather than mag passive ra sila.

— You can truly see that IBL is successful because it builds a child's curiosity. Because of IBL, children become engaged, and in turn, they will actively construct knowledge rather than just being passive learners. (P15).

These statements indicate that stimulating students' curiosity contributes greatly to IBL's success, where the art of questioning, whether repetitive or incorrect, is encouraged. According to Pedaste et al. (2020), the inquiry cycle of IBL prompts curiosity and critical thinking, especially in student-centered settings. However, despite the overall positive attitude toward IBL, participants still have doubts and hesitations in fully practicing this approach, reflected in their practices' quantitative score ($\bar{x} = 3.83$), which was the lowest compared to their scores in beliefs and difficulties. But still, as pre-service teachers continue to practice IBL, this assists students in building their understanding through self-directed learning rather than just receiving information directly from a teacher.

Teacher as a Facilitator. PSTs recognized their role as guides rather than lecturers, emphasizing a two-way learning process where they often learn alongside their students. However, they noted that transitioning to this role is challenging and requires advanced instructional skills. Thus, moving from direct instruction to guided support.

It is said by a participant that

Pag pangutan-on nila kay dira pud ma-challenge ko as a student-teacher kay biskan ako kay maka-learn pud ko sa ilaha. Ingun-ana na way na murag naga-questioning pud mi sa isa't isa. Di lang sila passive learning but active learning. Two-way learning pud siya.

— When they ask questions, it challenges me as a student-teacher, because I also learn from them. It's a way for us to question each other. It's not just passive learning for them, but active learning. It's also two-way learning. (P7).

As mentioned above, the teacher's role is a facilitator, meaning they guide students' learning as a participant.

Ikaw na teacher naa lang ka didtoa to support them. Offer support, to offer guidance sa ilaha.

— You, as the teacher, are simply there to support them. You're there to offer support and guidance to them. (P6).

It is evident in the participants' statements that pre-service teachers' guidance to students plays an important role in their learning. However, advanced skills are required for true facilitation, as supported by Adu-Gyamfi (2020), which brings light as contradictory to what is believed and how the score is lower on actual practice. Additionally, through students sparking curiosity, which leads them to ask questions, teachers not only facilitate and guide the students, but they can also learn from them. It is a two-way learning process where students and teachers go hand in hand as they go deeper into the lesson and their learning.

The qualitative themes confirm a high level of **methodological convergence**. While PSTs are theoretically willing and recognize the transformative ability of IBL, their classroom effort is often hindered by inadequate training and institutional-type support. This evidence justifies the need for structured interventions to bridge the gap between believing in IBL and practicing it confidently.

Conclusions and Recommendations

The study demonstrates that pre-service teachers (PSTs) hold highly positive beliefs toward Inquiry-Based Learning (IBL), viewing it as a transformative tool for fostering critical thinking and long-term retention. However, a significant discrepancy exists between these theoretical beliefs and actual classroom practices. Quantitative data revealed that while beliefs remain high, practice scores are notably lower, largely due to overwhelming perceived difficulties such as time constraints, curriculum alignment, and varying student readiness.

Qualitative insights further confirm that PSTs recognize the value of the "Teacher as a Facilitator" and the importance of fostering student curiosity, yet they often lack the advanced instructional skills and institutional support required for successful implementation. The methodological convergence suggests that while future educators are willing to adopt student-centered frameworks, systemic barriers and inadequate practical training prevent a seamless transition from theory to classroom execution.

To bridge the existing gap between theoretical support and classroom implementation, teacher education programs must move beyond advocacy and actively provide practical experiences that bolster the self-efficacy of pre-service teachers. Curriculum designers should prioritize the development of IBL-compatible lessons, strategically embedding inquiry cycles, specifically orienting, planning, investigating, and concluding, into most instructional units to align with student-centered standards and reduce adaptation barriers. To effectively foster curiosity and engagement, PSTs should be trained to pose open-ended, real-world problems, utilize question walls for student-generated queries, and incorporate collaborative strategies such as think-pair-share and

choice boards to promote learner ownership. Furthermore, for students with lower readiness levels, particularly in early grade levels, educators should employ scaffolded inquiry using visual aids and concrete manipulatives to build foundational readiness without requiring full open exploration.

Finally, institutionalizing mentorship between novices and experienced IBL practitioners, alongside peer observation and the provision of adequate resources, will provide the concrete input and professional modeling necessary to ensure the prolonged and effective application of Inquiry-Based Learning in the mathematics classroom.

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Declaration for Human Participants

This study was approved by the College of Teacher Education (CTE) of the University of Mindanao (Davao City, Philippines). Administrative and ethical clearance to conduct the study among practicum students was granted by the Research Coordinator and the Dean of the CTE, and the principles of the Declaration of Helsinki were followed.

AI-Use Disclosure Statement

The authors used Grammarly for the purpose of language editing, grammatical correction, and enhancing the clarity of the manuscript in accordance with institutional submission requirements. The authors have reviewed, verified, and taken full responsibility for the accuracy, originality, and integrity of the final manuscript.

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