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

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Abstract

This study aimed to investigate the beliefs of pre-service teachers about Inquiry-based learning, their perceived difficulties, and classroom practices in a classroom setting, which are related to their attitudes towards inquiry-based learning at a private university in Davao City during the school Year 2024-2025. This study employed a convergent mixed-method design involving 92 randomly selected pre-service teachers using stratified random sampling for the quantitative phase. For the qualitative phase, a sample of 15 pre-service teachers was selected through purposive sampling. The 15 samples comprised eight in-depth interviews and seven participants for the focus group discussions. Responses were gathered using a modified survey questionnaire, which included teacher beliefs and attitudes about inquiry-based learning. Moreover, quantitative data were summarized using mean and standard deviation, while qualitative data were analyzed through thematic analysis guided by Creswell's Procedural Spirals framework. The findings showed strong positive beliefs concerning the effectiveness of inquiry-based learning in enhancing learning for students, particularly in developing their critical thinking and involvement. However, less confidence in classroom practice suggests difficulty with applying that belief into practice, as demonstrated by qualitative themes. The findings suggested that teacher education programs should offer opportunities for training,

mentorship, and practical experiences to bridge the gap between motivation and skill in adopting inquiry-based learning to enhance student learning outcomes for pre-service teachers. To support effective implementation, this study recommends targeted professional development focusing on practical inquiry-based learning strategies, mentorship programs to build teacher self-efficacy, integration of practicum experiences, and curriculum reforms aligned with standardized requirements.

Keywords: Davao City, mixed-method design, teaching self-efficacy, teacher education programs

Introduction

Inquiry-Based Learning (IBL) is a teaching approach designed to actively engage students and develop higher-order thinking, problem-solving, and knowledge-building skills (Gholam, 2019). The transition to IBL of teacher education presents challenges for all teacher-educators, who prefer traditional instruction over student-centered methods. Such barriers include lack of professional development, lackluster institutional support, and stagnant curricula (Felske et al., 2020; Minner et al., 2010). Research shows the significance of understanding pre-service teachers' perceptions of IBL concerning student learning. Pre-service teachers' views and attitudes regarding IBL, shaped by heritage and experiences, vary immensely (Vishnubhotla et al., 2022). These differences are evident in how they would adopt and apply IBL, especially in mathematics education, and how they think cognitively (Vishnubhotla et al., 2022).

Pre-service teachers with positive dispositions and high self-efficacy towards Inquiry-Based Learning (IBL) should increase student involvement and achievement in inquiry-based learning, especially mathematics, where IBL promotes stronger reasoning abilities (Sen et al., 2021; Friesen & Scott, 2013). The Theory of Planned Behavior implies that pre-service teachers' attitudes, subjective norms, and perceived controls determine their intentions to adopt IBL (Ajzen, 1991). Moreover, Social Cognitive Theory confirms that when pre-service teachers observe how their peers and mentors use IBL in real-time scenarios, they gain self-confidence to adopt it as a teaching method (Bandura, 1986). Additionally, the Constructivist Learning Theory portrays collaborative efforts whereby pre-service teachers co-construct an understanding of IBL, increasing their confidence over time (Hein, 1991; Vygotsky et al., 1978). These theories explain how pre-service teachers' beliefs, molded by experience and professional preparation, influence their willingness to integrate IBL in future classrooms (Ramnarain & Hlatswayo, 2018; Wessels et al., 2017). Therefore, it is important to understand these factors for effective teacher education programs and to improve the

implementation of IBL and students' learning outcomes (Gholam, 2019; Fisher et al., 2016).

This study looks at three independent variables: teacher beliefs, teacher practices, and teacher difficulty in implementing IBL. Teacher beliefs are defined as convictions or understandings of the usefulness and practicality of IBL as it enhances student learning (Hmelo-Silver et al., 2007). Teacher practice encompasses real techniques and approaches pre-service teachers intend to apply in the classroom, especially those connected with inquiry-based learning (Adu-Gyamfi, 2020). It also covers how teachers are sophisticated in their knowledge of the perceived challenges in using IBL, such as student engagement management, responding to curriculum demands, and integrating IBL into standardized teaching approaches (Gholam, 2019; Ramnarain & Hlatswayo, 2018).

The focus thus shifted towards pre-service teachers' attitudes about IBL, what they think about the effectiveness of its implementation, and their accounts regarding its potential enactment in their prospective classrooms, besides the apparent onset of many hindrances in realizing such practices. Teacher beliefs are considered perceptions of the value of IBL by teachers regarding improving students' learning (Voet & De Wever, 2019; Hmelo-Silver et al., 2007). In addition to pre-service teachers' practices, known challenges include classroom management and curriculum alignment (Lehtinen et al., 2019; Ramnarain & Hlatswayo, 2018). Attitudes related to pre-service teachers being keen and eager to use IBL techniques in the future when they teach are important since they affect both the performance of IBL and the comprehensive adoption of methods centered around students in education (Yildiz-Feyzioğlu & Demirci, 2021). Indices for this variable comprise confidence in applying IBL strategies, the value assigned to IBL for improving student learning, and the difficulty or ease of enacting such approaches in several classroom scenarios.

There is a gap in understanding how pre-service teachers' beliefs and attitudes influence their adoption of IBL (Ketsing et al., 2020), especially in contexts with limited resources or traditional teaching norms (Ramnarain & Hlatswayo, 2018). The special challenges for pre-service teachers transitioning to an inquiry-based framework from traditional teacher-centered methods include classroom management difficulties, lesson planning issues, and problems in facilitating student-driven learning (Ramnarain & Hlatswayo, 2018; Fisher et al., 2016). This matter needs immediate attention: teacher education programs must instill in future educators the skills and confidence that would enable them to use IBL effectively in mathematics, where critical thinking is of utmost importance (Calleja, 2016). To work towards filling this gap in the literature, this study provides an in-depth account of pre-service teachers' attitudes toward IBL by

identifying beliefs, practices, and difficulties. Further, this research supports using qualitative data to examine dimensional nuances involving contextual aspects and subjective experiences that are implicated in forming attitudes that are ignored by quantitative methods alone (Creswell, 2019; Denzin & Lincoln, 2011).

This study's main objective is to explore pre-service teachers' beliefs and attitudes toward Inquiry-Based Learning (IBL). Although teacher education programs emphasize IBL, many pre-service teachers still have difficulty translating their theoretical understanding into practice. The literature strongly supports the claim that positive beliefs about IBL will significantly affect student-centered teaching. Still, it is unclear how far these beliefs influence actual classroom practices. Minimal research examines the relationship between pre-service teacher beliefs, practices, and the challenges they face in implementing IBL. Therefore, the study measures their beliefs, perceived difficulties, and classroom practices. For the qualitative part, the researchers would like to determine the perceptions of pre-service teachers' beliefs, difficulties, and practices toward inquiry-based learning. This study also tests the hypothesis that pre-service teachers' attitudes and self-efficacy in utilizing IBL do not necessarily guarantee effective adoption and sustained use of these strategies in classroom settings.

This investigation would be significant in dealing with pre-service teachers as key respondents on their beliefs, practices, and challenges regarding Inquiry-Based Learning (IBL), a major process for shaping future educational practices. The study would also be significant in the local reform for educator preparation at the University of Mindanao, relative to the institution's advocacy for innovative ways of teaching. The study aims to inform teacher education programs at the university regarding curriculum design and professional development to equip future educators for student-centered approaches better. The study also aligns with Quality Education, or Sustainable Development Goal 4, as it advocates for IBL to offer inclusive and equitable education by fostering critical thinking, problem-solving, and active learning. The study aims to fill in the gap between pre-service teachers' enthusiasm by promoting these IBL methods and their challenges of actual implementation, thus supporting global efforts in improving and enhancing the quality of education and establishing lifelong learning opportunities for all.

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 participants in this study for the quantitative phase comprised 92 pre-service teachers undergoing Teaching Internship at the College of Teacher Education (CTE) of a private university in Davao City. The respondents varied in their academic programs and, therefore, possessed varied experience in Inquiry-Based Learning (IBL). With stratified random sampling, academic programs with Math subjects were chosen. A stratum with a fair sampling of respondents from two academic programs, Math and Generalist, was ensured with a total population of 21 and 71 pre-service teachers, respectively. This way, the sampling technique ensured balance in groupings concerning the background of the participants so that diverse points of view could be represented in the findings. The sample 92 that was provided under Conroy (2018) and Fox (2024) provided in this study, a statistical power of 95% confidence level and 5% margin of error, which was deemed acceptable to study the beliefs and attitudes of IBL of pre-service teachers.

For the qualitative phase, a sample of 15 pre-service teachers was selected through purposive sampling. The 15 samples consisted of eight in-depth interviews (IDIs) and seven participants for focus groups (FGDs). Moreover, based on specific purposes of purposive sampling, the final sample of this study represented participants with multiple experiences with IBL and allowed sufficient detail to be captured concerning beliefs, practices, and difficulties upon analyzing the IDIs and FGDs. Sample sizes closely corresponded with suggestions regarding sample size and data saturation in qualitative research, specifically by Hennink and Kaiser (2022), emphasizing the determination of data saturation with 15 qualitative interviews. Participants were informed of their capability to withdraw at any moment without further implications, preparing to proceed to the next phase of data collection. This assisted with ensuring ethical obligations in research and the individual and/or autonomous member checking aspects of the criteria for selection and exclusion early.

Research Instruments

The data collection instruments comprised the modified version of the survey questionnaire developed by Ramnarain and Hlatswayo (2018) and a series of sub-questionnaires that included one consisting of self-efficacy constructs. The instruments consisted of four major sections; section one focused upon profiling the respondents and provided demographic data, including academic background and teaching experience, section two addressed teacher beliefs, whereby 11 items have been developed to measure the participants' perspectives towards the effectiveness and practicalities of IBL. The third section comprised 11 items that assessed participants'

intended classroom practices concerning IBL. The fourth section had 15 items that explored the difficulties pre-service teachers faced in delivering IBL, including student engagement, curriculum alignment, and classroom management.

The questionnaire made use of a 5-point Likert scale, with responses ranging from "strongly disagree" (1) to "strongly agree" (5). The interpretation of the scores was that negative attitudes range from 1.0 to 2.4, neutral responses from 2.5 to 3.4, and positive attitudes from 3.5 to 5.0, with homogeneity of responses across the sections. Cronbach's alpha was used to assess the internal consistency of the survey, verifying that this instrument is reliable and valid in obtaining full-scale data. In pilot testing the instrument, the survey yielded Cronbach's alpha values of 0.885, 0.872, and 0.883 in different indicators, indicating good to excellent internal consistency to administer the questionnaires and reliability of survey items (Tavakol & Dennick, 2011).

The qualitative phase was carried out using a semi-structured interview guide. Each interview started with one main question for each research question and four probing questions to test participants' perceptions concerning their beliefs and experiences. The qualitative instrument aimed to supplement the survey by providing a richer and fuller understanding of why pre-service teachers have these beliefs and how those beliefs lead them to teach as they do. The researcher developed and verified a questionnaire, followed by expert validation, to confirm the alignment of the items with the research objectives.

Design and Procedure

The convergent mixed-methods design presented by Creswell and Clark (2017) was the most suitable alternative for tackling this research problem of understanding pre-service teachers' beliefs, difficulties, and practices related to Inquiry-Based Learning (IBL) in such a way that it unveiled different shades of interactivity among these factors. As a result, quantitative and qualitative data coalesce for a more extensive understanding of this research problem, which is complex. In the quantitative phase, 92 pre-service teachers were surveyed to obtain broad descriptive results with descriptive statistics like the mean and standard deviation regarding their beliefs, perceived challenges, and practices. Thus, it allowed a stronger statistical examination of prevalent trends and correlations by aggregating the results from a colorful sample, which is a worthy representation achieved through stratified random sampling (Fox, 2024; Conroy, 2018).

Narrowing the focus to in-depth interviews (IDIs) and focus group discussions (FGDs) with 15 purposively selected participants, the qualitative phase enriched the survey study that revealed some deeper contextual and

subjective experiences therein shaping pre-service teachers' attitudes toward IBL. It matters when considering why certain beliefs or challenges are allegedly maintained, as qualitative data can mine deeper dimensions, whereas suppression is preferred in quantitative methods (Creswell, 2019; Denzin & Lincoln, 2011). Thematic analysis following the Creswell Procedural Spirals (2014) built itself toward an iterative refinement of themes to saturation, depth, and trustworthiness in the findings. The merging of the quantitative breadth and qualitative depth through this converged design analysis allowed for triangulation-evidence of patterning and contrasting that gave a fuller account of how pre-service teachers' backgrounds, self-efficacy, and contextual challenges weigh on their IBL adoption (Ramnarain & Hlatswayo, 2018).

Given the purpose of this study, which is to fill the gap in the literature regarding IBL adoption by pre-service teachers' beliefs, difficulties, and practice in resource-stricken or traditional educational contexts, the said design stood to be the best. Mixed methods approach triangulated findings, presenting measurable trends that enabled the point about what teacher education programs should target in terms of providing training and mentorship to facilitate a grounding of theoretical support for IBL in practical implementation (Gholam, 2019; Fisher et al., 2016).

Besides this, the study also followed indicators of trustworthiness: credibility, transferability, dependability, and confirmability. This, therefore, endowed strength to the qualitative data generated in this study. Triangulation of both quantitative and qualitative methods further enhanced the validity and reliability of the findings. Using a convergent mixed-methods approach was an advantage in this research because it gave the reader a complete overview of pre-service teachers' beliefs, difficulties, and practices toward IBL, besides making an important contribution to teacher 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	*M*	*SD*
Beliefs	4.27	0.48
Difficulties	4.35	0.44
Practice	3.83	0.54
Overall	**4.15**	**0.42**

The quantitative data further indicate that pre-service teachers had grand beliefs regarding Inquiry-Based Learning (IBL), with ($\bar{x}$ = 4.27, SD = 0.48) as its mean score. The pre-service teachers strongly believed that through IBL, students could learn better than in traditional teaching methods, reinforcing the earlier findings showing that positive beliefs were linked to being open to student-centered approaches (Voet & De Wever, 2019; Hmelo-Silver et al., 2007). Furthermore, the mean score for classroom practice was lower at ($\bar{x}$ = 3.83, SD = 0.54), indicating that pre-service teachers believed in IBL but lacked confidence in using it, possibly because of items tackling the challenges of making lesson planning or classroom management difficult, which corresponds to a problem in the development of teaching identity (Adu-Gyamfi, 2020; Gholam, 2019). This was also confirmed by qualitative findings, which indicate barriers such as time constraints or different learner readiness that can be attributed to the decline in responses to practice-related items. The moderate variability (SD = 0.54) suggests diverse confidence levels, influenced by limited practical experience.

The highest mean score of perceived difficulties ($\bar{x}$ = 4.35, SD = 0.44) indicates an overwhelming agreement regarding the difficulties of IBL implementation, which most likely attributed to items on time, student engagement, and curriculum alignment, supported by qualitative themes like "Constraints and Barriers" (Lehtinen et al., 2019; Ramnarain & Hlatswayo, 2018). However, the trend of attitudes towards IBL is still generally positive ($\bar{x}$ = 4.15, SD = 0.42), showing hope in terms of using IBL as to its potential, probably with linkages to beliefs in critical thinking and real-world application. The small standard deviation concerning such barriers (SD = 0.44) means that all respondents equally recognize these barriers. This gap between strong belief and lower practice scores illustrates why there is a need for special training to fill the gap between what is supported by theory and what is done in practice, according to theoretical frameworks such as the Theory of Planned Behavior and Social Cognitive Theory (Ajzen, 1991; Bandura, 1986).

Considering the results, this study's theoretical framework aligns well with these results. For instance, according to Ajzen's Theory of Planned Behavior, attitudes and beliefs can often be used to shape intentions. However, the effects of perceived difficulty can also affect whether those

intentions are converted into a particular behavior. In addition, as per Bandura's Social Cognitive Theory, if teachers feel confident and hear of others' successes, they will probably want to adopt these new methods. Furthermore, Vygotsky's Constructivist Learning Theory holds that collaborative, real-world learning experiences can help shape positive beliefs and reinforce IBL, a teaching method based on an argument for this theory.

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

Conducting the qualitative phase, in-depth interviews (IDIs) and focus group discussions (FGDs) among 15 purposively selected pre-service teachers served to complement the quantitative findings through a deeper understanding of their beliefs, difficulties, and practices with Inquiry-Based Learning (IBL). Creswell's Procedural Spirals framework (2014) was used for thematic analysis, which revealed six major themes that explain the somewhat nuanced experiences of the pre-service teachers in the private university in Davao City, as well as some insights into how such attitudes are directing IBL adoption in teacher education. These themes fit well with the quantitative findings, which bring to light strong belief ($\bar{x}$ = 4.27, SD = 0.48), moderate confidence in practice ($\bar{x}$ = 3.83, SD = 0.54), indisputable high perceived difficulty ($\bar{x}$ = 4.35, SD = 0.44)—pointing toward the urgent need to have intensive targeted training to guarantee a successful bridging of theoretical support with its onsite application (Fisher et al., 2016).

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

Indicators	Theme	Core Idea
Beliefs	Deep, Active Learning	• Student-centered learning • Encourages critical thinking and independent discovery • Construction of students' own knowledge
	Real World Application	• Connection of lessons to daily life • Improves long-term retention • Meaningful learning
	Growth and Engagement	• Progress being evident through assessments and application • Students' engagement and willingness to participate
Difficulties	Constraints and	• Time limitations

	Barriers	• Varying level of learners • Students' unpreparedness and lack of interest
Practices	Questioning and Curiosity	• Students ask questions • Deeper understanding built through questioning • Curiosity leads to exploration and self-directed learning
	Teacher as a Facilitator	• Interactive process of learning • Teachers guide students' learning

Deep, Active Learning. This theme presents how inquiry-based learning (IBL) is perceived in a classroom setting. Participants shared their experiences and understanding of how IBL is applied and how it helps students learn. Additionally, IBL is believed to be a student-centered approach promoting active engagement and critical thinking, working through the constructivist principles of learners' knowledge construction; thereby emphasizing the transition from passive to active learning, indicating students' autonomy, particularly in mathematics.

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. Another theme generated based on participants' responses is IBL's application to the real-world context. A few have mentioned how this approach becomes meaningful as lessons connect to real-life events that help retain knowledge. On top of that, participants appreciated IBL's capacity to create connections between classes and real-life situations, thus augmenting meaningful learning and memory.

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 nakadiscover 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 naa nay 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. The pre-service teachers believe that the success of IBL was seen through students' engagement and learning. As time went by and the implementation of the IBL teaching approach, student engagement became evident, reflecting their growth. However, engagement and growth would also be impossible without the students' willingness to participate.

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. Despite IBL's many indicators of success, it also faces a fair share of difficulties. Time limitations, varying levels of learners, and students' unpreparedness and lack of interest are just a few of the constraints and barriers faced by pre-service teachers in implementing IBL.

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 akoa, 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).

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. 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. As IBL is viewed by the participants as a student-centered learning approach where students explore and construct their own knowledge, curiosity plays an important role in this approach's effectiveness. If curiosity is instated, IBL flows naturally with inquiry by the learner through questions leading toward self-learning. It is said that participants do not mind and tend to practice repeating themselves to clarify students' queries, which then increases knowledge.

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. From the previous statements, IBL is viewed by pre-service teachers as student-centered, which implies that teachers only facilitate student learning as they actively explore and construct their knowledge. However, despite the teachers' role as learning facilitators, the interactive learning process still takes place. It also appears that the facilitator of learning puts students' explorations into better validity with the self-efficacy concept of teacher development.

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 mixed-method approach was useful in establishing a high level of reliability from both qualitative and quantitative results, showing a very high level of converging evidence. The quantitative results provided evidence from the high positive beliefs in IBL ($\bar{x}$ = 4.27, SD = 0.48) and moderate confidence in classroom practices ($\bar{x}$ = 3.83, SD = 0.54), and high perceived difficulty ($\bar{x}$ = 4.35, SD = 0.44). The few themes that closely match are qualitative themes: Deep, Active Learning, Real World Application, and Growth and Engagement, which highlight pre-service teachers' recognition of the student-centered nature of IBL and its ability to foster critical thinking and engagement. Following the same avenue, perceived difficulties scored high in the quantitative aspect, which corresponded to the qualitative theme of Constraints and Barriers, emphasizing rather practical barriers in the process, such as time, differing readiness levels of learners, and curriculum alignment. Compared to the participants' beliefs and perceived difficulties, the lower score on practice confidence also finds reflection in qualitative results, particularly on the themes of Teacher as Facilitator and Questioning and Curiosity, suggesting that though pre-service teachers value IBL, they lack the qualification for effective implementation. There were no significant areas of disconformity, since both data sets underscore the same gap regarding the lack of adequate training for IBL.

Conclusions and Recommendations

The quantitative results reveal that the pre-service teachers' scores imply that they believe strongly in inquiry-based learning (IBL) because of what they feel is an implication of the high mean score that IBL generally ends up fostering critical thinking and students' active participation in classes. Even so, if you look at their confidence in applying the method in class, it is much lower, revealing a discrepancy between theory and practice. On the other hand, the highest scores were on the perceived challenges, and some of these are problems like time, alignment to the curriculum, and meeting the needs of diverse learners, which could explain much of the divergence in scores. Hence, it could be inferred here that pre-service

teachers are enthused about the belief that there will be a lot of possible applications of IBL, while practical challenges and little experience prevented them from doing so actively; thus, it raises the question of better training and resources.

Additionally, the qualitative findings offer a richer perspective on pre-service teachers' experiences, identifying themes like deep active learning, real-world relevance, and student engagement, which align with their positive views on IBL. Nevertheless, themes such as constraints and barriers, including time limitations and varying student readiness, emphasize the practical difficulties they encounter. Thus, the significance of both the teacher as a facilitator and fostering student curiosity points to the truly transformative ability of IBL. However, it also includes the advanced skills that every teacher must possess for such a teaching style to be successful. This means that these insights further support the view that while pre-service teachers recognize the value of IBL, implementation remains problematic because of shortcomings in the context and lack of skills, thereby calling for specific support.

By employing a convergent mixed-methods approach, which integrates quantitative trends with qualitative narratives, this study provides a holistic understanding of pre-service teachers' engagement with IBL. Quantitative belief scores and low confidence in practice are corroborated with qualitative themes in which high external difficulties, such as time limitation and learner diversity, are countered by the application of IBL's student-centered nature. Besides, the methodological convergence brings out a core issue: strong theoretical underlying belief in IBL does not seamlessly translate into classroom effort due to barriers such as inadequate training and institutional-type support. Thus, the approach highlights the difficult nature of IBL adoption, implying that while pre-service teachers are willing, some structured interventions will link the practice into place.

On the path to bridging these gaps, teacher education programs ought to be active in providing practical experiences bolstering the IBL confidence of pre-service teachers while stressing strategies for planning time and handling varied learner needs. Moreover, building up some mentorship between novices and experienced IBL practitioners would further enhance self-efficacy and give concrete input. Making the curriculum offer IBL-practicums can allow pre-service teachers to practice IBL in a real-world environment. Then, curriculum reformation should guarantee that IBL teaching is standardized for easy implementation. Finally, peer observation would help regenerate effective IBL practices and ensure their prolonged application in improving student learning achievements.

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