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Development of an Inquiry-based Learning Training Program for Junior High School Physics Teachers

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Abstract

Learner-centered instructional approaches that engage students in questioning, investigating, and reflecting are essential for developing critical thinking and conceptual understanding in Physics. This study examined the competence and challenges of Junior High School Physics teachers in one of the Schools Divisions in Ilocos Norte to guide the development of a tailored inquiry-based learning (IBL) training program. Using a mixed-methods explanatory sequential design, 126 teachers participated in surveys and interviews. Findings revealed that teachers demonstrated very satisfactory competence in content knowledge, pedagogy, classroom management, and professional growth, yet faced persistent challenges including limited subject mastery, constrained class time, insufficient laboratory and digital resources, and students' readiness for self-directed inquiry. Exposure to prior IBL-related training was strongly associated with higher competence. In response, the SCI*GLAT* program was developed to enhance content knowledge, lesson planning, resource utilization, and strategies for engaging diverse learners. The study underscores the importance of context-specific, evidence-based professional development to bridge gaps between curriculum objectives and classroom practice, ultimately strengthening Physics instruction.

Keywords: Challenges; Competence; Inquiry-based learning; Physics teachers; Training program

Introduction

Inquiry-Based Learning (IBL) is a learner-centered instructional approach that actively engages students in questioning, investigating, gathering evidence, and reflecting on their findings. Grounded in constructivist learning theory, IBL emphasizes that knowledge is actively constructed by learners as they interact with their environment, rather than passively received (Bruner, 1961; Vygotsky, 1978). In physics education, where concepts are often abstract and cognitively demanding, IBL has been shown to enhance students' conceptual understanding, problem-solving abilities, and scientific reasoning compared to traditional teacher-centered instruction (Sarsale & Langub, 2023). By engaging students in authentic inquiry processes, IBL also cultivates critical thinking and lifelong learning skills that are essential for navigating complex real-world phenomena.

Despite its demonstrated benefits, the successful implementation of IBL is heavily dependent on teachers' pedagogical competence and sustained instructional support. Recent studies indicate that physics teachers encounter both intrinsic and extrinsic barriers to effectively enacting IBL strategies. Common challenges include limited pedagogical content knowledge, insufficient experience with inquiry-based practices, time constraints, and inadequate instructional resources. These obstacles often undermine teachers' confidence and restrict the consistent and meaningful application of IBL in classroom contexts. Specifically, teachers report difficulties in designing inquiry-based lesson plans, facilitating student-led investigations, and aligning assessments with inquiry goals, all of which compromise the potential impact of IBL on student learning outcomes (Dah, et al., 2024).

In the Philippine educational landscape, the Revised K to 12 Science Curriculum explicitly promotes learner-centered and inquiry-oriented approaches in science instruction, including physics. The curriculum emphasizes the development of students' analytical, investigative, and problem-solving skills to prepare them for higher education and real-world challenges. However, local research suggests that the effective enactment of IBL remains inconsistent. Students often struggle with problem-solving tasks, conceptual understanding, and hands-on laboratory activities, reflecting a gap between curricular objectives and classroom implementation (Bogador et al., 2024). These gaps are frequently linked to systemic constraints, such as limited classroom resources, large class sizes, and varying levels of teachers' instructional readiness, which hinder the full realization of inquiry-based learning outcomes.

Given these persistent challenges, there is a critical need for professional development programs that are data-driven, contextually grounded, and responsive to teachers' actual instructional competencies and classroom realities. Generic or one-size-fits-all training programs risk being misaligned with teachers' needs and may fail to address specific barriers to effective inquiry implementation. By systematically examining the current level of competence and identifying the challenges faced by Junior High School Physics teachers, this study seeks to provide an empirical foundation for designing a tailored IBL training program. Such a program aims to enhance teachers' confidence, instructional skills, and capacity to facilitate inquiry-oriented learning, ultimately strengthening physics education and supporting the goals of the Revised K to 12 Science Curriculum.

In essence, this study responds to both a practical and pedagogical imperative: to bridge the gap between policy and practice by developing professional development interventions that are informed by actual classroom realities and grounded in evidence. The research outcomes are expected not only to improve teaching quality but also to contribute to the broader discourse on teacher professional development and inquiry-based science education in the Philippines.

Research Questions

This study aimed to develop an inquiry-based learning training program for Junior High School Physics teachers.

Specifically, it sought answers to the following questions:

1. What is the profile of the Physics teachers?
2. What is the level of competence of Physics teachers in implementing inquiry-based learning?
3. Is there a significant relationship between the Physics teachers' profile and their level of competence in implementing inquiry-based learning?
4. What challenges do Physics teachers encounter in implementing inquiry-based learning?
5. What inquiry-based learning training program can be developed?

Methods

Research Design

This study used a mixed-methods explanatory sequential design to guide the development of an inquiry-based learning (IBL) training program for junior high school physics teachers. It began with the collection of quantitative data on teachers' profile and their competence in implementing IBL, which were analyzed using descriptive and inferential statistics to identify trends and relationships. This was followed by qualitative interviews that explored the challenges teachers encountered in implementing IBL, with thematic analysis conducted to uncover key insights and experiences. By integrating both quantitative and qualitative findings, the study aimed to create a training program that was evidence-based and responsive to the actual needs of teachers.

Locale of the Study

The study was conducted in the Junior High Schools of the Schools Division of Ilocos Norte (SDOIN) because it represented a relatively large population offering a suitable environment for gathering relevant data. The division implements the K to 12 and MATATAG curricula, which explicitly emphasize learner-centered and inquiry-based pedagogical approaches in Science, particularly in Physics. This made the locale appropriate for examining teachers' competence, perceptions, and classroom practices related to Inquiry-Based Learning.

Population and Sampling Procedure

The population of this study consisted of Junior High School Physics teachers currently teaching in the Schools Division of Ilocos Norte (SDOIN). A total of 126 Physics teachers were selected as respondents through purposive sampling, ensuring that participants possessed the relevant experience and active teaching role necessary to provide meaningful insights on inquiry-based learning implementation.

Research Instrument

The study employed a three-part survey instrument to gather data from Junior High School Physics teachers.

Part I collected the teachers' demographic profile, including age, sex, highest educational attainment, years of teaching experience, and trainings or seminars related to inquiry-based learning (IBL). Meanwhile, Part II utilized a 5-point Likert scale to assess teachers' competence in implementing IBL. Lastly, Part III consisted of guided interviews to explore the challenges teachers encountered in implementing IBL and to gather insights on the development of an IBL training program.

The instrument underwent rigorous validation process to ensure relevance, accuracy, and alignment with the research objectives.

Data Gathering Procedures

Prior to the conduct of the study, permission to conduct the study was sought from the Dean of the MMSU Graduate School and from the Schools Division Superintendent of SDOIN to ensure the voluntary participation of Junior High School Physics teachers. Upon receiving the necessary approvals, data were collected through an online platform to facilitate efficient and safe participation. The gathered data were then systematically organized, analyzed using appropriate statistical methods, and interpreted to inform the formulation of conclusions and the development of subsequent recommendations.

Data Analysis

The data collected in this study were analyzed using both quantitative and qualitative methods. Quantitative data on teachers' profiles and competence in implementing IBL were summarized using descriptive statistics, such as frequency, percentage, mean, and standard deviation, while Pearson's correlation coefficient was computed to determine relationships between selected profile variables and competence levels. Qualitative data from guided interviews on the challenges teachers encountered were analyzed using thematic analysis to identify recurring patterns and themes. Finally, the quantitative and qualitative findings were integrated to provide a comprehensive understanding of teachers' competence and experiences, which guided the development of an evidence-based and contextually relevant IBL training program.

Ethical Considerations

This study strictly followed the research protocol approved by the University Research Ethics Review Board (URERB) to ensure compliance with ethical standards. Participation of Junior High School Physics teachers was entirely voluntary, and respondents were informed of their right to withdraw at any time without consequence. Data were collected through an online survey platform, ensuring anonymity of participants, and access to the data was restricted solely to the researcher. No personal or private information was disclosed without consent, no monetary or other forms of compensation were provided, and all data were securely discarded after the completion of the study.

Results and Discussion

Profile of Physics Teachers

This section presents the demographic and professional profile of Junior High School Physics teachers. Understanding the respondents' background is essential in contextualizing their level of competence and the challenges they encounter in implementing inquiry-based learning (IBL), as these characteristics may influence instructional practices and professional development needs.

Table 1. Profile of Physics teachers.

Characteristics		f	Percentage (%)
Age	60-65	3	2.38
	54-59	7	5.56
	48-53	12	9.52
	42-47	23	18.25
	36-41	34	26.98
	30-35	27	21.43
	24-29	20	15.87
Sex	Male	18	14.29
	Female	108	85.71

Highest Educational Attainment	Ed.D./Ph.D.	0	0.00
	Master's degree with Ed.D./Ph.D.	0	0.00
	Master's degree	48	38.10
	Bachelor's degree with MA/MS units	48	38.10
	Bachelor's degree	30	23.80
Teaching Position	Teacher VI	6	4.76
	Teacher V	0	0.00
	Teacher IV	0	0.00
	Teacher III	90	71.43
	Teacher II	12	9.52
	Teacher I	18	14.29
Number of Years of Teaching Experience	35-39	1	0.79
	30-34	1	0.79
	25-29	5	3.97
	20-24	8	6.35
	15-19	19	15.08
	10-14	35	27.78
	5-9	45	35.71
	0-4	12	9.52
Number of Trainings related to Inquiry-based Learning	2	9	7.14
	1	48	38.10
	0	66	54.76

1. *Age*

Table 1 presents the age distribution of Junior High School Physics teachers. Teachers aged 36–41 years represent 26.98% of the sample, followed by those aged 30–35 years (21.43%) and 42–47 years (18.25%). This indicates that a substantial proportion of the teaching force is in the early to mid-career stage, suggesting a combination of practical experience and potential openness to adopting innovative instructional approaches such as inquiry-based learning.

2. *Sex*

The data indicate that 108 teachers (85.71%) are female and 18 teachers (14.29%) are male. This demonstrates a pronounced gender distribution in Physics instruction within the division, which may be considered when designing professional development programs to ensure responsiveness to the demographic composition of the teaching population.

3. *Highest Educational Attainment*

Teachers with a master's degree account for 38.10%, an equal proportion (38.10%) hold a bachelor's degree with MA/MS units, and 23.80% possess only a bachelor's degree. No respondents have doctoral-level qualifications. These results suggest variability in academic preparation, which underscores the need for professional development programs that enhance pedagogical competence in inquiry-based learning.

4. Teaching Position

Teachers holding the position of Teacher III constitute 71.43% of the sample, while Teacher I, Teacher II, and Teacher VI account for 14.29%, 9.52%, and 4.76%, respectively. This distribution reflects a teaching workforce concentrated at the mid-career level, which has implications for designing training programs aimed at strengthening instructional skills and facilitating career development in science education.

5. Number of Years of Teaching Experience

Teachers with 5–9 years of experience represent 35.71% of the respondents, followed by 10–14 years (27.78%) and 15–19 years (15.08%). Respondents with 0–4 years or more than 20 years of experience comprise smaller proportions. These data indicate a range of professional experience levels, suggesting that professional development in inquiry-based learning could support both skill consolidation and pedagogical advancement.

6. Number of Trainings related to Inquiry-based Learning

Regarding participation in IBL-related trainings, 54.76% of teachers reported no prior training, 38.10% attended one training, and 7.14% attended two trainings. These results reflect limited exposure to inquiry-based instructional strategies, which highlights the importance of developing a structured and context-specific training program to enhance competence and confidence in implementing IBL in Physics classrooms.

The results of this study are consistent with the findings of Khalil and Gunduz (2023) that existing professional development programs often do not provide sufficient depth or sustained support for teachers to implement inquiry-based instruction effectively, highlighting gaps in training that limit teachers' ability to translate inquiry theory into classroom practice. This aligns with the current finding that more than half of the Physics teachers in this study have not attended any training related to inquiry-based learning, and only a small fraction participated in more than one training session. The limited exposure to structured inquiry-based training suggests a disconnect between curricular expectations and teachers' preparation to enact inquiry strategies, emphasizing the need for comprehensive, ongoing, and context-responsive professional learning opportunities. Inadequate training in inquiry-based learning not only affects classroom implementation but may also contribute to lower levels of instructional confidence and competence, justifying the development of a tailored IBL training program grounded in the actual needs and experiences of teachers.

Physics Teachers' Competence in Implementing Inquiry-based Learning

Determining the competence of Junior High School Physics teachers is essential because the effective implementation of inquiry-based learning (IBL) relies on teachers' content knowledge, pedagogical skills, and instructional practices. Assessing competence establishes a baseline of teachers' strengths and gaps, ensuring that the proposed training program is needs-based, contextually relevant, and aligned with curriculum expectations rather than generic or misaligned with classroom realities.

Table 2. Physics teachers' competence in implementing inquiry-based learning.

Statements	Mean	DI
Content Knowledge and Pedagogy		
1. Content knowledge and its application within and across curriculum areas	4.21	VS

2.	Research-based knowledge and principles of teaching and learning	4.07	VS
3.	Positive use of ICT	4.14	VS
4.	Strategies for promoting literacy and numeracy	4.17	VS
5.	Strategies for developing critical and creative thinking, as well as other higher-order thinking skills	4.14	VS
6.	Mother Tongue, Filipino and English in teaching and learning	4.12	VS
	Composite Mean	**4.14**	**VS**
Learning Environment			
7.	Classroom communication strategies	4.10	VS
8.	Learner safety and security	4.21	VS
9.	Fair learning environment	4.17	VS
10.	Management of classroom structure and activities	4.29	VS
11.	Support for learner participation	4.21	VS
12.	Promotion of purposive learning	4.17	VS
	Composite Mean	**4.19**	**VS**
Diversity of Learners			
13.	Management of learner behavior	4.12	VS
14.	Differentiated teaching to suit learner's gender, needs, strengths, interests, and experiences	3.98	VS
15.	Differentiated teaching strategies that are responsive to the learners' linguistic, cultural, socio-economic and religious backgrounds.	3.95	VS
16.	Use strategies responsive to learners with disabilities, giftedness and talents.	3.90	VS
17.	Demonstrate understanding of the special educational needs of learners in difficult circumstances, including geographic isolation; chronic illness; displacement due to armed conflict, urban resettlement or disasters; child abuse and child labor practices.	3.86	VS
	Composite Mean	**3.96**	**VS**
Curriculum and Planning			
18.	Planning and management of teaching and learning process	4.12	VS
19.	Learning outcomes aligned with learning competencies	4.12	VS
20.	Relevance and responsiveness of learning programs	4.10	VS
21.	Professional collaboration to enrich teaching practice	4.10	VS
22.	Teaching and learning resources including ICT	4.10	VS
	Composite Mean	**4.11**	**VS**
Assessment and Reporting			
23.	Design, selection, organization and utilization of assessment strategies	4.10	VS
24.	Monitoring and evaluation of learner progress and achievement	4.05	VS
25.	Feedback to improve learning	4.05	VS
26.	Communication of learners needs, progress and achievement to key stakeholders	3.95	VS
27.	Use of assessment data to enhance teaching and learning practices and programs	4.14	VS
	Composite Mean	**4.06**	**VS**

Community Linkages and Professional Engagement

28. Establishment of learning environments that are responsive to community contexts	4.02	VS
29. Engagement of parents and the wider school community in the educative process	3.95	VS
30. Professional ethics	3.92	VS
31. School policies and procedures	4.10	VS
Composite Mean	**4.00**	**VS**
Personal Growth and Professional Development		
32. Philosophy of teaching	4.17	VS
33. Dignity of teaching as a profession	4.12	VS
34. Professional links with colleagues	4.10	VS
35. Professional reflection and learning to improve practice	4.12	VS
36. Professional development goals	4.12	VS
Composite Mean	**4.13**	**VS**
Overall Mean	**4.08**	**VS**

It can be gleaned from Table 2 that the composite mean scores across all seven competence categories are interpreted as very satisfactory, indicating a generally high level of competence among Junior High School Physics teachers.

In terms of *Content Knowledge and Pedagogy*, the composite mean of 4.14 suggests that teachers demonstrate strong mastery of physics content and its application, research-based teaching principles, use of ICT, strategies for literacy, numeracy, and higher-order thinking, as well as multilingual instructional practices. This level of competence provides a solid foundation for the implementation of inquiry-based learning, as teachers possess the necessary knowledge and pedagogical skills to guide students through investigative and reflective learning processes.

In terms of *Learning Environment*, the composite mean of 4.19 indicates that teachers are competent in establishing and maintaining safe, fair, and structured classrooms, promoting learner participation, and facilitating purposeful learning. This suggests that the conditions for implementing inquiry-based learning are generally supportive, enabling students to actively engage in investigations, collaborate, and apply critical thinking skills in a controlled and encouraging environment.

In terms of *Diversity of Learners*, the composite mean of 3.96 reflects teachers' competence in managing learner behavior and employing differentiated strategies responsive to learners' gender, abilities, linguistic, cultural, socio-economic, and special needs. While still very satisfactory, this category has the lowest mean among all areas, indicating that additional support may be beneficial in designing inclusive inquiry-based activities that address diverse learner profiles effectively.

In terms of *Curriculum and Planning*, the composite mean of 4.11 suggests that teachers are competent in planning and managing lessons aligned with learning outcomes, utilizing relevant teaching programs and resources, and engaging in professional collaboration. This competence implies that teachers have the necessary skills to design inquiry-based lessons that are structured, relevant, and responsive to curriculum standards.

In terms of *Assessment and Reporting*, the composite mean of 4.06 indicates that teachers are competent in selecting and applying assessment strategies, monitoring and evaluating learner progress, providing feedback, communicating with stakeholders, and using assessment data to inform instruction. This level of competence supports the integration of assessment practices within inquiry-based learning, although targeted training could further enhance the connection between assessment and inquiry processes.

In terms of *Community Linkages and Professional Engagement*, the composite mean of 4.00 shows that teachers demonstrate competence in professional ethics, adherence to school policies, and engagement with parents and the wider community. This competence highlights the teachers' awareness of the social and professional contexts influencing instruction, which can facilitate the integration of community-based inquiry projects and enhance relevance to learners' experiences.

In terms of *Personal Growth and Professional Development*, the composite mean of 4.13 reflects teachers' commitment to professional reflection, maintaining the dignity of teaching, collaboration with colleagues, and pursuing professional development goals. This indicates that teachers are generally open to continuous learning and are likely to engage effectively in structured training programs, such as the proposed inquiry-based learning program.

These findings conform to the findings of Sarsale & Langub, 2023; Bogador et al., (2024) on teacher competence and inquiry-based instruction, which report that experienced physics teachers tend to exhibit high levels of content knowledge, pedagogical skill, and professional engagement, but often require additional support in differentiation and inclusive practices. The consistency of these results with prior research reinforces the reliability of the data and underscores the relevance of developing a structured IBL training program that enhances teachers' capacity to address diverse learner needs while sustaining their existing strengths in pedagogy and professional practice.

Relationship between the Physics Teachers' Profile and Level of Competence in Implementing Inquiry-based Learning

The correlation coefficients between each profile characteristic of Junior High School Physics teachers and their competence in implementing Inquiry-Based Learning (IBL) is presented in Table 3. Investigating these relationships is critical to understand whether teachers' demographic or professional factors influence their competence, and to justify the development of targeted training programs that address areas of greatest need.

Table 3. Correlation coefficients of Physics teachers' profile and their competence in implementing IBL.

Profile Variable	Competence of Physics Teachers in Implementing IBL							Overall Competence
	1	2	3	4	5	6	7	
Age	0.178	0.162	0.150	0.155	0.168	0.170	0.175	**0.165**
Sex	0.045	0.048	0.040	0.042	0.043	0.050	0.047	**0.046**
Highest Educational Attainment	0.310	0.300	0.275	0.290	0.285	0.280	0.305	**0.295**
Teaching Position	0.265	0.270	0.260	0.275	0.268	0.263	0.270	**0.269**
Number of Years of Teaching Experience	0.190	0.182	0.170	0.175	0.180	0.185	0.188	**0.180**
Number of Trainings related to Inquiry-based Learning	0.480	0.500	0.460	0.470	0.490	0.470	0.495	**0.485**

The data reveal several important patterns. Sex demonstrates negligible correlations (r = 0.040–0.050), indicating it does not significantly influence IBL competence. Age and years of teaching experience exhibit low to moderate positive correlations (r = 0.150–0.190), suggesting that more experienced teachers may have slightly higher competence, though experience alone does not guarantee mastery. Highest educational attainment and teaching position are moderately correlated with competence (r = 0.260–0.310), implying that formal qualifications and professional rank are associated with better performance. Notably, the number of IBL-related trainings demonstrates the strongest positive correlations (r = 0.460–0.500), emphasizing that prior exposure to inquiry-based practices is strongly linked to higher competence.

These findings are consistent with recent research in physics education. Sarsale and Langub (2023) reported that targeted professional development in inquiry-based instructional strategies improves teachers' pedagogical competence and confidence. Likewise, Bogador et al. (2024) found that exposure to structured IBL trainings enhances teachers' capacity to implement differentiated instruction, curriculum planning, and student-centered learning in science classrooms. The strong association between IBL-related trainings and competence observed in this study aligns with these findings, providing empirical justification for developing a professional development program tailored to Junior High School Physics teachers in the Schools Division of Ilocos Norte.

Challenges Encountered by Physics Teachers in Implementing Inquiry-based Learning

This section presents the challenges encountered by Physics teachers in implementing inquiry-based learning. Table 4 summarizes the identified challenges as perceived by the respondents, providing a systematic account of the factors that may hinder effective implementation of inquiry-based practices in Physics instruction. These findings offer essential context for understanding the constraints faced by teachers and serve as a basis for interpreting the need for targeted interventions and the proposed training program.

Table 4. Challenges encountered by Physics teachers in implementing IBL.

Theme	Codes	Particulars
Instructional Preparation and Content Demands	• Limited Physics content mastery • Extensive lesson preparation • Managing misconceptions	Teachers reported challenges in preparing inquiry-based Physics lessons, especially those with limited content background. Effective lesson planning required developing thought-provoking questions, anticipating student misconceptions. Addressing abstract Physics concepts increased the complexity of instructional preparation.
Time and Curriculum Constraints	• Insufficient class time • Curriculum coverage pressure • Administrative workload	Limited time allotment emerged as a major constraint in fully implementing IBL. Teachers reported that short class periods, overlapping school activities, and administrative reporting requirements often

		caused rushed inquiry cycles or the omission of key phases, such as exploration and reflection. Lessons were sometimes simplified or became more teacher-directed to meet curriculum demands.
Resource and Learning Environment Limitations	• Lack of laboratory facilities and equipment • Limited instructional materials and ICT • Poor internet connectivity	Many teachers highlighted the lack of laboratory facilities, equipment, and instructional materials as significant barriers to conducting hands-on inquiry activities. Limited access to ICT resources, including unreliable internet and incompatible devices, further constrained the use of digital simulations, often forcing teachers to modify or reduce the depth of inquiry-based lessons.
Student Readiness and Engagement Challenges	• Insufficient foundational knowledge • Difficulty adapting to student-centered learning • Communication and collaboration issues	Teachers observed that many students lacked the foundational knowledge and skills necessary for effective inquiry, including question formulation, experimental design, and data analysis. Difficulties in transitioning from passive learning to self-directed inquiry, coupled with weak communication skills and fear of making mistakes, limited active participation. Managing diverse learner needs and sustaining engagement during group activities posed further challenges.

1. *Instructional Preparation and Content Demands*

Instructional preparation and content demands emerged as a key theme, highlighting the challenges teachers face in planning inquiry-based Physics lessons. Educators must integrate deep content knowledge with careful lesson structuring while anticipating student misconceptions, a task particularly difficult for those with limited Physics background. Teachers reported that gaps in understanding abstract concepts, such as Newton's laws or energy, increase the cognitive load in designing meaningful inquiry activities. Developing IBL lessons requires considerable time to formulate questions, plan experiments, and address potential misconceptions, making it more labor-intensive than traditional lesson planning.

This implies that effective IBL implementation depends heavily on teachers' content competence and pedagogical preparation, as insufficient knowledge or planning can compromise the quality and depth of inquiry activities.

This is supported by the statements of the teachers as follows:

"Deeper concepts because I am not a major nor minor in Physics." – Teacher 1

"Teachers must create questions that are thought-provoking with an extensive planning time. Teacher must predict or be ready for some misconceptions of students." – Teacher 18

"Preparing IBL Physics lessons involves challenges such as time constraints, limited resources, student-resistance to the self-discovery process." – Teacher 19

"It requires more preparation time and longer class period." – Teacher 3

"I have to prepare three lesson plans. Integrating IBL would need much preparation for these three different subjects." – Teacher 16

"Addressing misconceptions; physics concepts are abstract and students often form persistent errors." – Teacher 13

These findings are consistent with Sugandi et al. (2022), who highlighted that strong content mastery is essential for sustaining inquiry-based science instruction, particularly in Physics, as limited knowledge often results in simplified inquiry tasks. Similarly, Permana (2023) reported that teachers with weaker subject backgrounds tend to compress or skip key inquiry phases, paralleling the present study's challenges in managing misconceptions and facilitating open-ended discussions. Moreover, Hadji Abas and Marasigan (2020) found that insufficient teacher preparedness prioritizes curriculum coverage over conceptual understanding, supporting the need for a structured IBL training program to address identified competence gaps.

2. *Time and Curriculum Constraints*

Time and curriculum constraints emerged as a significant barrier to effective IBL implementation. Teachers reported difficulties balancing mandated curriculum coverage with the flexible pacing required for inquiry-based activities. Limited class periods restrict students' engagement in exploration, experimentation, and reflection, often forcing teachers to rush lessons or adopt more teacher-directed approaches. Administrative tasks, reporting requirements, and overlapping school activities further reduce time for preparation and implementation.

This implies that structural adjustments in class schedules and curriculum pacing are essential to ensure meaningful and impactful inquiry-based learning.

This is supported by the statements of the teachers as follows:

"Limited time allotment significantly affects the ability to fully implement IBL strategies by forcing teachers to reduce or eliminate key elements of the inquiry process." – Teacher 19

"With short class periods (many activities/extra-curricular), investigations are often skipped, resulting in a more guided approach." – Teacher 9

"Students have a hard time comprehending the physics lessons due to limited time." – Teacher 21

"Rushed student thinking, students need to think critically and discuss their answers." – Teacher 3

"Time allocation for laboratory is not enough." – Teacher 28

"True inquiry needs time for students to ask questions, design investigations, collect data, and reflect. With short periods, I sometimes have to rush or skip exploration and reflection stages." – Teacher 24

This finding conforms with Achuthan et al. (2021), who noted that inquiry-based learning requires sufficient time, as limited periods reduce inquiry to task completion, consistent with teachers' reports in this study. Additionally, Bektas et al. (2022) emphasized that shortened inquiry phases limit higher-order reasoning, aligning with the superficial understanding observed. Moreover, Galasso et al. (2023) found that curriculum and administrative demands push teachers toward teacher-directed approaches, paralleling the simplification of inquiry lessons noted here.

3. Resource and Learning Environment Limitations

Resource availability and the learning environment play a critical role in IBL implementation. Teachers reported that limited access to laboratories, instructional materials, and reliable ICT tools constrained hands-on investigations. Missing apparatus, consumables, and incompatible devices reduced the authenticity of inquiry activities, while unreliable internet restricted the use of digital simulations.

This implies that adequate physical and digital resources are essential for meaningful and effective inquiry-based learning.

This is supported by the statements of the teachers as follows:

"No internet connection in the classroom; students cannot access simulations because it is not compatible with their devices." – Teacher 25

"Limited school resources result in simplifying lessons, sometimes reducing depth of inquiry." – Teacher 10

"Inquiry lessons work best when students can experiment, but we often lack lab equipment and sensors." – Teacher 24

"Lack of laboratory room to perform experiments." – Teacher 4

"Availability of materials is limited." – Teacher 2

"Some students are not used to asking questions. Therefore, it is hard to shift to student-centered; equipment limitations." – Teacher 9

The findings are consistent with Hadji Abas and Marasigan (2020), who reported that inadequate laboratory facilities and defective equipment significantly limit hands-on science activities, often compelling teachers to rely on theoretical instruction. Additionally, Supriyatman et al. (2024) emphasized that schools in non-urban and resource-limited areas frequently face shortages in both laboratory and digital resources, requiring teachers to improvise activities, which may reduce the rigor of inquiry tasks. These findings reinforce the importance of addressing resource constraints through targeted training and instructional support.

4. Instructional Preparation and Content Demands

Student readiness and engagement significantly affect the effectiveness of IBL. Teachers reported that gaps in students' foundational Physics knowledge hindered their ability to formulate questions, design experiments, and analyze data. Many learners required guidance to transition from passive to self-directed inquiry, while limited communication skills and low confidence reduced active participation in collaborative tasks.

This implies that scaffolding prior knowledge and fostering self-directed learning are essential for meaningful engagement in inquiry-based activities.

This is supported by the statements of the teachers as follows:

"The most common student-related challenge is lack of self-directed learning skills such as organization and time management." – Teacher 19

"Some students can't comprehend the lesson through student-centered activities; traditional methods are sometimes used." – Teacher 25

"Learners nowadays cannot express their ideas due to weak communication skills, especially in English." – Teacher 23

"Difficulty asking questions; difficulty with calculations, measurements, and analysis." – Teacher 9

"The most common challenge is difficulty moving from passive to self-directed learning." – Teacher 6

"Some introverted students are not cooperating much." – Teacher 16

The findings are consistent with Malik et al. (2020), who emphasized that learners' prior knowledge significantly affects their ability to engage in inquiry-based activities, with weak foundational concepts limiting students' questioning, investigation, and interpretation skills. Further, Cruz (2020) highlighted the importance of instructional scaffolding to support students' transition from teacher-centered to inquiry-based learning, as unstructured tasks may lead to disengagement. These studies align with the present research, reinforcing the need for teacher training programs that equip educators to scaffold inquiry and address gaps in student readiness.

SCI*GLAT* Training Program

The findings of the study revealed that while Junior High School Physics teachers demonstrated very satisfactory overall competence, they encountered persistent challenges related to content mastery, time constraints, resource limitations, and student readiness in implementing inquiry-based learning. These challenges indicate a clear gap between teachers' perceived competence and the practical demands of sustained IBL implementation.

TRAINING PROGRAM	**SCI*GLAT*: Strengthening Competence in Inquiry-Based Learning through Guided Learning Approaches Training**
PROGRAM OBJECTIVES	• Enhance teachers' content knowledge and pedagogical skills for IBL in Physics. • Build teachers' capacity to manage time, curriculum, and instructional resources effectively. • Improve teachers' strategies to engage students and address diverse learning needs through inquiry. • Equip teachers with practical tools, lesson planning, and hands-on experiences to implement IBL confidently.

TRAINING PROGRAM MATRIX

Day	Time	Session / Activity
DAY 1: Content Mastery and Instructional Preparation	7:30–9:00 AM	Registration and Orientation Program
	9:00–10:30 AM	Session 1: Understanding Inquiry-based Learning Principles and Benefits
	10:45–12:15 NN	Session 2: Strengthening Physics Content Knowledge for IBL
	1:00–3:00 PM	Session 3: Anticipating Student Misconceptions and Effective Questioning
	3:00–5:00 PM	Workshop: Open Forum Designing Your IBL Lesson Plan
DAY 2: Time, Curriculum, and Resource Management	8:00–10:00 AM	Session 4: Efficient Lesson Planning and Curriculum Alignment
	10:15–12:00 NN	Session 5: Maximizing Limited Class Time for Inquiry Activities
	1:00–3:00 PM	Session 6: Leveraging Resources and ICT in Inquiry-Based Lessons
	3:00–5:00 PM	Workshop: Open Forum and Modifying Lessons Using Available Resources
DAY 3: Student Engagement and Differentiated Instruction	8:00–10:00 AM	Session 7: Strategies for Engaging Diverse Learners
	10:15–12:00 NN	Session 8: Promoting Critical Thinking and Self-Directed Learning
	1:00–2:00 PM	Session 9: Addressing Student Challenges and Supporting Participation
	2:00–4:00 PM	Workshop: Open Forum and Peer Review and Simulation of IBL Activities
	4:00-5:00 PM	Closing Program

In response to the challenges encountered by junior high school Physics teachers in implementing inquiry-based learning (IBL), the SCI*GLAT* Training Program was developed. This training program is designed to enhance teachers' content mastery, instructional skills, resource management, and strategies for engaging diverse learners. The program directly addresses the difficulties highlighted in the study, including limited content knowledge, extensive preparation demands, time and curriculum constraints, lack of instructional resources, and students' readiness to participate in inquiry activities.

This structured approach ensures that teachers not only gain theoretical knowledge but also practical skills through workshops that allow for reflection, application, and collaboration. By the end of the training, teachers are expected to improve their competency in planning and implementing inquiry-based Physics lessons, effectively manage instructional resources and time, and foster an inclusive and participatory learning environment.

The SCI*GLAT* Training Program was developed to bridge the gap between teachers' current competencies and the demands of IBL, offering solutions that are aligned with the findings of this study. Its design reflects the realities of junior high school classrooms, where content mastery, time management, resource limitations, and student readiness are critical factors affecting the successful implementation of inquiry-based teaching. By addressing these key areas, the program provides a practical, contextualized, and research-based intervention that supports professional growth and enhances the quality of Physics instruction in the Division of Ilocos Norte.

The development and implementation of teacher training programs, particularly in inquiry-based learning, is supported by existing literature highlighting the positive impact of professional development on teaching competence and student outcomes. Studies by Akpan and Andre (2020) and Duran and Duran (2021) emphasize that teachers often face challenges such as limited content knowledge, insufficient pedagogical skills, and classroom management difficulties, which can hinder the effective adoption of inquiry-based approaches. Furthermore, professional development programs that combine theoretical understanding with hands-on workshops have been shown to improve teachers' instructional strategies, enhance confidence in content delivery, and foster student engagement (Darling-Hammond et al., 2017; Hsu et al., 2022). In the Philippine context, recent studies by Abas and Marasigan (2020) underline the necessity of localized training initiatives that consider contextual factors such as limited resources, large class sizes, and time constraints, making programs like SCI*GLAT* a relevant and timely intervention for supporting Physics teachers in junior high schools.

Conclusions

This study aimed to determine the status of public junior high school Physics teachers in terms of their competence in implementing Inquiry-Based Learning (IBL). Findings revealed that teachers demonstrate very satisfactory competence in content knowledge, pedagogical strategies, classroom management, and professional growth. However, challenges such as limited content mastery, time and curriculum constraints, inadequate resources, and varying student readiness continue to hinder the full implementation of IBL. These results highlight the need for structured professional development programs to strengthen teachers' inquiry-based instructional practices.

In response to these needs, the training program SCI*GLAT*: Strengthening Competence in Inquiry-Based Learning through Guided Learning Approaches Training was formulated. The program is designed to enhance teachers' skills in lesson preparation, content application, and student engagement while providing practical strategies to overcome challenges. Through a combination of interactive sessions and hands-on workshops, teachers can practice designing IBL lessons, anticipate misconceptions, and effectively manage diverse learners.

Overall, the study emphasizes the importance of continuous teacher development to ensure effective IBL implementation. Providing localized training programs, adequate learning resources, mentoring, and supportive school policies can further empower teachers to apply inquiry-based strategies in their classrooms confidently. SCI*GLAT* serves as a practical and structured approach to bridging gaps in competence, ultimately fostering improved learning experiences for students in Physics.

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