



SCIENCE TEACHERS USE OF INQUIRY-BASED TEACHING METHODS IN TEACHING JUNIOR HIGH SCHOOL SCIENCE AMONG SELECT SECONDARY SCHOOLS IN BALIWAG

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ABSTRACT

Most of the students are not interested in science, it is often perceived as a challenging subject but is undeniably important for us to understand the world and drive progress within the society. Teachers need to be creative as Picasso because this subject demands this to keep little minds interested and challenge the big ones. Teachers are required to use varieties of methods to foster scientific skills required to attain the goal of science education- to create a learner that will apply science in dealing and solving real-life problems. One of the methods is known as the Inquiry-Based Learning (IBL), a student-centered method which is recognized for its effectiveness in enhancing essential skills among learners. In spite of its significant potential, the implementation of IBL is associated with challenges for science teachers. This led the researcher to conduct a descriptive quantitative study that will explore the Junior High School Science Teachers' perception regarding the use of Inquiry-Based Learning (IBL) method as well as its challenges and overall perception. The researchers selected a total of twenty-five (25) Junior High School Science from select schools in Baliwag through purposive sampling method. Based on the result, it shows that there is no significant difference on the assessment of junior high school science teachers on the use of IBL by gender ($p=0.878$) and teachers' specialization ($p=0.605$), but there is a highly significant difference on year level taught ($p=0.001$). Findings revealed strong agreement among teachers ($M = 4.58$) on the benefits of IBL in science education, and agreement ($M = 3.81$) on challenges such as large class sizes ($M = 4.08$) and preparation ($M = 3.96$). Overall, the teachers' perception of IBL ($M = 4.48$) implies that the use of this method is beneficial in enhancing the junior high school students' essential science skills. The study recommends that

Division offices and educational supervisors implement targeted training and workshops to enhance teachers' expertise in Inquiry-Based Learning (IBL). The researchers anticipate that this study will serve as a valuable reference for future researchers exploring other aspects of IBL.

Keywords: *Inquiry-based learning, science education, active learning, science teachers*

INTRODUCTION

One familiar quotation that we often hear is, “Education is the key to success” but if we are to analyze the current situation that we have in education today, can it still help us to become successful? Is our education itself successful in producing globally competitive learners who possess 21st century skills and that can bring change to our world?

The Program for International Student Assessment (PISA) was introduced in 2000. The Organization for Economic Co-operation and Development (OECD) uses it as a benchmarking tool. Every three years, it seeks to evaluate the proficiency and application of 15-year-olds' knowledge and skills in reading, arithmetic, and science (World Bank, 2020).

PISA defies traditional testing conventions, as Amanda Ripley succinctly puts it: "This bizarre new test called PISA, which stood for the Program for International Student Assessment. Instead of a typical test question, which might ask which combination of coins you needed to buy something, PISA asked you to design your own coins, right there in the test booklet.

PISA is not just like a typical examination where you are asked to memorize things and terminologies to answer questions. It is about how students think critically, how they can solve problems and how they respond to it. PISA is more than just words that you need to remember, it is how you apply the knowledge and concept you have learned. It is a tool used to analyze the current educational system a country has.

Science is one of the areas explored in the Programme for International Student Assessment (PISA). Participating in the Program for International Student Assessment (PISA) for the first time in 2018, the Philippines ranked second to the last among 79 participating countries in science Philippines ranked third from the bottom in science with an average score of 357 in 2018 (Limlingan, 2024). In the Science Literacy area of the most recent Program for International Student Assessment (PISA) 2022, Philippines performs poorly, and it has been recognized by the Department of Education (DepEd). To address this, DepEd aimed to improve the standard of basic education. This includes revising the K–10 Curriculum, popularly known now as the MATATAG Curriculum.

The revised curriculum will “reintroduce the basic foundation of education to our learners — the literacy and numeracy competencies” and ensure they develop 21st century skills, Vice President and Education Secretary Sara Duterte said (Chi, 2023).

In Deped Matatag, science curriculum highlighted the use of Inquiry based learning. It has been developed with the view that science is important for Filipino learners to increase scientific learning and technology to be able to adapt in this challenging world.

A study by Owens and Hite (2020); Simanjuntak and Silalahi (2022) as cited by Etienne (2022) discussed that the use of problem-based learning models, discovery-learning models and inquiry-based learning (IBL) models have been considered as powerful methods in teaching and learning science subjects.

Inquiry-based learning is an education approach that focuses on investigation and problem-solving. Instead of presenting information, or 'the answer', up-front, teachers start with a range of scenarios, questions and problems for students to navigate (www.education.gov.au, 2023). Yonwong et al. (2024) says that creativity is one of the skills that today's youth must master. Individuals must be multiskilled and possess 21st-century abilities that is beyond literacy and computation. These are all essential skills that will help students in their future studies and careers (Liego,2022).

In a classroom where inquiry-based learning is used as an approach, teachers shift from being the exclusive sources of information or from a teacher centered approach to becoming facilitators of students in exploring and uncovering knowledge independently Inquiry-based learning is a student-centered approach which let students to delve into their own capacity and discover things. It is an approach wherein students become responsible for their own learning. It helps them to acquire 21st century skills that will shape them to be lifelong learners.

However, a lot of teachers still find it difficult to put this method into practice. Teachers still find it difficult to incorporate this approach into their lessons, partly because it has been discovered that inquiry-based learning is very successful in developing higher-order thinking capabilities and practical skills. Yet, teachers trying to effectively apply inquiry-based learning method face a problem due to a lack of continual professional development (Etienne, 2020).

In a similar vein, Geletu et al. (2024) research found that natural science teachers in secondary education have an overall positive view of using inquiry-based teaching (IBT) techniques.

Given these positive findings, the study revealed that teachers of natural science seldom use IBL methods in the classroom. This study indicates that the use of inquiry-based teaching methods has a significant impact on the quality of teaching and learning in natural science courses. For the teachers to utilize it properly, providing in-service training for them will be beneficial to enhance their skills, improve their teaching quality that can uplift learning students learning outcomes

The objective of this descriptive quantitative study is to describe the Perception of Junior High School Science Teachers in select schools in Baliwag with regards to the use of inquiry-based learning. The purpose of this study is for the researchers to outline the fundamental concept of inquiry-based learning, its use and its perceived challenges. The

results of this study could be used as a basis for curriculum designers to enhance science education practices, exposing teachers to varieties of programs focusing on the effective ways of using Inquiry-Based learning methods. The findings of this study could also be used as a reference for future researchers.

Review of Related Literature and Studies

Program for International Student Assessment (PISA) Philippines Country Report

The Program for International Student Assessment (PISA) was introduced in 2000. The Organization for Economic Co-operation and Development (OECD) uses it as a benchmarking tool. Every three years, it seeks to evaluate the proficiency and application of 15-year-olds' knowledge and skills in reading, arithmetic, and science (World Bank, 2020).

The tests explore how well students can solve complex problems, think critically and communicate effectively. This gives insights into how well education systems are preparing students for real life challenges and future success.

Science is one of the areas explored in the Programme for International Student Assessment (PISA). Science is found to be beneficial in increasing the scientifically literate population that can make informed decisions that are essential to different aspects such as health, personal well-being, and societal issues as well as the environment.

Participating in the Program for International Student Assessment (PISA) for the first time in 2018, the Philippines ranked second to the last among 79 participating countries in science Philippines ranked third from the bottom in science with an average score of 357 in 2018 (Limlingan, 2024).

DepEd Response to PISA

In 2018 program for International Student Assessment (PISA) The Philippines performs poorly in the science literacy category and this has been recognized by the Department of Education (DepEd). In response with the PISA results, DepEd highlights the need to fix the gaps in basic education quality and enhance educational standards. This is in line with DepEd's ongoing Sulong Edukalidad program, which has the goal to raise the country's standard of education and suggests that improvement is necessary to achieve progress. (DepEd's Battlecry Going Forward: Sulong Edukalidad | Department of Education, 2019).

In science and reading, yet this challenge was mostly unchanged. The percentage of students who performed below competency levels in science, math, and reading did not change largely despite efforts. Notably, with an average score of 356 in science—slightly less than the 357 in 2018—the Philippines placed third from the bottom in the PISA results for 2022 (Limlingan, 2024).

PISA 2022 found that curiosity — or the eagerness to learn new things and explore the unknown — was generally associated with creative thinking performance. Students who reported being curious about many things and liking to know how things work scored

around three points higher in creative thinking than those who did not, according to the OECD average (Chi, 2024).

With this DepEd responds to the emerging context for current and future students, aiming to implement bold changes to enhance the standard of elementary education in the Philippines. DepEd came up with a plan to revise and modernize the K to 10 Curriculum popularly known now as the MATATAG curriculum.

The revised curriculum will “reintroduce the basic foundation of education to our learners — the literacy and numeracy competencies” and ensure they develop 21st century skills, Vice President and Education Secretary Sara Duterte said (Chi, 2023).

The Shape of the Grades 3 to 10 Science in Matatag Curriculum

The Science curriculum supports Filipino learners to engage with science-related issues, and with the ideas of science, as a reflective citizen. It supports them to explain phenomena scientifically, evaluate and design scientific inquiry, and interpret data and evidence. It encourages and supports them to apply scientific, environmental, technological, and engineering knowledge, practices, and principles in the context of real-life situations. (*MATATAG Curriculum | Department of Education, n.d., sec. Science Curriculum Guide*)

In DepEd Matatag, science curriculum gives attention on implementing Inquiry based learning. It is designed with the view that science is important for Filipino learners that can increase their scientific, technological and prepare them in this challenging world.

Definition and principles of Inquiry-Based Learning

Inquiry-based learning is an education approach that focuses on investigation and problem-solving. Inquiry-based learning is different from traditional approaches because it reverses the order of learning. Instead of presenting information, or ‘the answer’, upfront, teachers start with a range of scenarios, questions and problems for students to navigate (*www.education.gov.au, 2023*).

In a Journal written by Yonwong et al. (2024) says that creativity is one of the skills that today’s youth must master. Individuals must be adaptable and possess 21st-century abilities beyond literacy and computation.

Inquiry-based instruction requires students to think critically about the information they are learning. They must evaluate evidence, consider different perspectives, and make reasoned arguments. These are all crucial skills that will help students in their future studies and careers (Llego,2022).

The emphasis on exploration instills students with curiosity, resilience, and optimism, enabling students to investigate and design independently. Furthermore, encouraging argumentation and reasoning in a supportive environment enhances scientific discourse, prompting students to generate questions, formulate opinions, and

make informed decisions. Embracing failure as a natural part of problem-solving promotes reflection, resilience, and ongoing improvement in learning.

This shows that creativity is an important skill for the youth. It emphasizes the need for individuals to be adaptable and equipped with 21st-century competencies that go beyond basic literacy and computation skills and make them globally competitive individuals.

However, the current learning approach is significantly inversely related to the aim of science education, which is to perform a scientific investigation to build high-level thinking skills in students, including critical- and creative-thinking skills (Muskiti et al., 2020)

This suggests that the existing learning approach does not meet the objectives of science education, which aims to prepare and enhance students' high-level thinking abilities, including critical and creative thinking skills.

Furthermore, an effective approach to promote creative thinking abilities to the students is through the utilization of the inquiry-based learning framework.

In addition, research by Susilowati (2020); Fitri et al. (2022); and Astalini et al. (2023) as cited by Suyatmo et al. (2023), promotes active learning and encourages students to explore and discover new concepts through experimentation.

Unlike traditional methods where information is presented directly, the Inquiry Based approach starts with scenarios, questions, and problems for students to explore and navigate on their own. Which helps students to have a deeper understanding of the subject matter.

Teaching Science That Is Inquiry-Based: Practices and Principles

Evidence has emerged in recent years regarding the importance of teaching science through an inquiry-based approach where students are encouraged to be actively involved in investigations that challenge their curiosity, encourage them to ask questions, explore potential solutions, use evidence to help explain different phenomena, and predict outcomes under different conditions. The inquiry process is complex and multifaceted as it involves students reconciling their current understandings of a problem with both the evidence obtained from an inquiry while also being able to demonstrate their understandings in ways that are logical, well-reasoned, and viewed as justifiable (Gillies, 2023).

A study by Owens and Hite (2020) and Simanjuntak and Silalahi (2022) as cited by Twahirwa et al. (2022) argued that the use of problem-based learning models, discovery-learning models and inquiry-based learning (IBL) models have been considered as effective methods in teaching and learning science subjects.

The inquiry-based learning challenges students to connect their prior knowledge based on evidence, that promotes logical and well-reasoned understanding of scientific phenomena.

The Role of Teacher in Inquiry Based Learning

Teachers play a significant role in a classroom. The role of a teacher in a traditional or conventional classroom is quite different compared in an inquiry-based classroom.

According to Silber (2023), in a traditional classroom, students are passive. Teachers have been seen as the primary source of knowledge and instruction in a classroom setting. Whereas in an inquiry-based classroom, students actively participate in learning, leading to higher engagement with both the process and content.

In an inquiry-based approach, teachers transition from being the exclusive sources of information to becoming facilitators who steer students in exploring and uncovering knowledge independently.

According to Llego (2022) in his article "Inquiry-Based Learning: What It Is and Why You Should Use It," the role of the facilitator is to assist students in asking good questions, locating relevant information, and interpreting what they discover.

Because the role of the teacher in an inquiry-based classroom is unusual, it is sometimes misunderstood.

Challenges of Teachers in an inquiry-based learning method.

Scientific inquiry is increasingly becoming a prominent trend in science education globally, aiming to promote inquiry-based learning and enhance students' scientific literacy. Yet, many teachers struggle with this approach and are unsure how to introduce it effectively in their classrooms.

The study by Etienne (2022) highlighted the significant impact of choosing appropriate teaching and learning approaches on students' understanding in science education. Inquiry-based learning was found to be particularly effective in enhancing practical skills and fostering higher-order thinking abilities. However, the lack of ongoing professional development poses a challenge for teachers looking to implement inquiry-based learning strategies effectively.

Similarly, Geletu et al. (2024) study revealed that natural science teachers generally have a positive perception of utilizing Inquiry-Based Teaching (IBT) methods in secondary schools, leading to increased motivation in implementing these methods. Despite this positivity, the study found that natural science teachers infrequently incorporate IBT methods in their instruction. The findings suggest that the quality of teaching and learning in natural science subjects relies on consistent utilization of IBT methods. Therefore, providing in-service training to teachers to enhance their skills in implementing IBT methods is crucial for improving teaching quality and student learning outcomes in natural science subjects.

It is evident that teachers face common challenges when it comes to implementing inquiry-based teaching methods effectively. One such challenge is the need for ongoing professional development to support teachers in incorporating inquiry-based learning strategies into their teaching practices.

Additionally, the gap between teachers' positive perceptions of inquiry-based methods and the actual implementation in the classroom, indicating a need for further support and resources to bridge this disconnect is also seen as a challenge.

Moreover, the studies highlight the importance of continuous in-service training for teachers to improve their skills and confidence in utilizing IBL methods, emphasizing the necessity for sustained professional development to enhance teaching quality and student learning outcomes in science subjects.

Related Theories

This study was anchored on the following Theories:

The Theory of Constructivism of Jean Piaget emphasizes the active role of learners in building their own knowledge. Constructivism in education is an approach that focuses on allowing learners to construct their own understanding of a subject by actively engaging with the material presented to them (ELM Learning, 2024).

In inquiry based-learning learners are responsible to build their own understanding rather than passively receiving information. They are encouraged to question and investigate science concept for a deeper comprehension

Experiential learning can bridge the gap between theory and practice which leads learners to have a holistic and meaningful experience and increase their engagement in class. In inquiry based-learning, learners are exposed to hand-on activities, experiments and other real-world applications of the concept that they have learned in science for them to apply their knowledge and see the essence of understanding the topic. With these students will be actively involved leading to a better knowledge, makes them more creative, improved retention, and developed their critical thinking skills.

Conceptual Framework

The research paradigm shows how the research will take place through the I-P-O or the Input-Process-Output system. The input consists of the profile of science teachers according to their gender, age range, year level taught and specialization. Moreover, the process to be used requires the questionnaire survey to be analyzed and presented to generate answers for the research problems presented. The output, therefore, presents the Science Teachers perception regarding Inquiry based- learning, its usefulness and challenges they encountered.

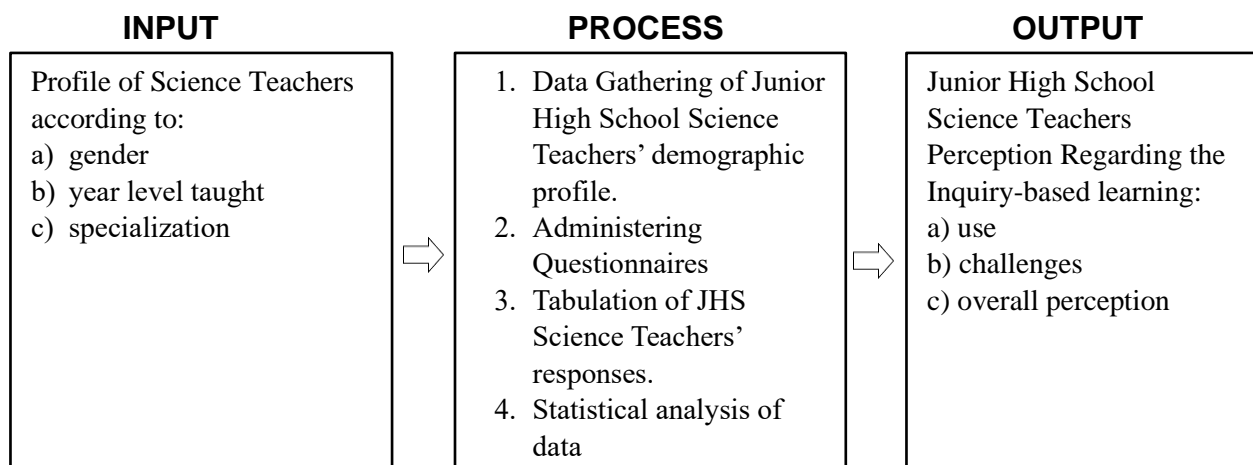


Figure 1. Conceptual Framework of the Study

Research Questions

This study aims to investigate science teachers' use of inquiry-based teaching methods in teaching junior high school science among select secondary schools in Baliwag.

Specifically, this seeks answer to the following:

- Does the use of inquiry-based teaching methods show statistically significant differences between: (a) male and female teachers; (b) year level taught; and (c) teachers' specialization
- How do teachers perceive the usefulness of inquiry-based learning methods in teaching science?
- How do teachers perceive the challenges encountered in the use of inquiry-based learning methods?
- What is teachers' Perception regarding inquiry-based learning method?

Significance of the Study

The purpose of the study is to investigate how junior high school science teachers' from select secondary schools in Baliwag perceive inquiry-based learning as well as its usefulness and its challenges in teaching methods. The research findings may help the teachers to enhance their pedagogical skills and improve students' science literacy by improving their teaching approaches that will cater students' needs. As for the students, they will be more engaged in an interactive learning experience that will foster deeper understanding of scientific concepts, develop essential skills such as creative thinking, critical thinking, experimental, and problem-solving skills.

By knowing the challenges encountered by the teachers in facilitating the inquiry-based learning method, the school curriculum designers and planners can design and implement professional development programs for teachers by training educators' effective strategies for integrating inquiry-based learning methods into their classroom and develop educational resources which will support teachers throughout the facilitation. Lastly, this study can serve as a framework for future researchers to formulate new questions related to inquiry-based learning methods.

METHODOLOGY

Respondents and Sampling

The respondents in this research consist of 25 Junior High School teachers from select secondary schools in Baliwag that are currently handling science subjects. Among them, 16 are from Mariano Ponce National High School, and 9 are from Virgen Delas Flores High School. These teachers were chosen through Total Population Sampling. Total population sampling is a type of purposive sampling technique that involves examining the entire population (i.e., the total population) that have a particular set of characteristics (Total Population Sampling | Lærd Dissertation, n.d.). This method ensures that all eligible individuals in the population are included, providing a comprehensive view of the subject matter.

Research Design

This study will utilize a descriptive quantitative research design. Descriptive research design is a type of research design that aims to systematically obtain information to describe a phenomenon, situation, or population. More specifically, it helps answer the what, when, where, and how questions regarding the research problem rather than the why (Voxco, 2021).

The use of descriptive quantitative research design in this study is grounded in the need to systematically gather numerical data that will allow for a detailed description of the various aspects of teachers' perceptions regarding inquiry-based learning. It will present statistical data that describes the prevalence and distribution of how teachers perceive the usefulness of inquiry-based learning and the challenges they face in applying this teaching method in the science classroom.

Data Gathering Procedure

The researchers looked for standardized questionnaires pertaining to the perception of Junior High School science teachers' regarding the usefulness of Inquiry-based learning methods as well as the possible challenges encountered by the teachers in integrating it during the teacher and learning process. Following this, the researchers submitted a letter of consent to the principals of the selected Secondary School to conduct the study and request the population of the target respondents. Upon obtaining approval, the researchers immediately administered the survey questionnaires face-to-face to the

respondents with the assistance of the school head and master teacher. Subsequently, the gathered responses were reviewed to ensure that the required number of samples was met. The whole process of the data collection took 2 weeks.

Instrumentation

The study utilized the two different Likert-scale instruments to assess the junior high school teachers' perception in IBL, its usefulness and challenges they encountered. It is adapted from two different studies, First is the secondary school science teachers questionnaires (3STQ) by Twizeyimana Etienne et.al (2022), Second is a 5 point Likert scale for teachers perceptions of the use of inquiry-based teaching methods from the study about "Ethiopian Journal of Education Studies Perception and Performance of Secondary School Science Teachers' Inquiry- Based Methods of Teaching in Hawassa University Technology Villages" by Girma Moti Geletu et.al (2024). Both questionnaires contain closed ended items. These questionnaires were designed intentionally to get teachers insights and perceptions about usefulness of IBL and perceived challenges by the junior high school science teachers in select secondary schools is Baliwag when incorporated in science education. The instrument is divided into 3 parts, first is the Teachers' Perception of the Use of Inquiry-based Learning Method, second is Challenges Encountered by Teachers in Inquiry-based Teaching Methods and Third part is the overall perception of Teachers' Regarding IBL. All parts of the instruments used the Likert 5 point valued as strongly agree (5), agree (4), undecided (3), disagree (2), and strongly disagree (1).

Data Analysis

The data collected from this study was tabulated in a statistical spreadsheet software called Jamovi for descriptive and inferential analysis. Descriptive statistics, including the weighted mean and standard deviation, were employed to analyze the science teachers' responses in terms of the use, challenges, and overall perception of the IBL in the teaching and learning process. Additionally, inferential statistics, specifically the Independent Sample T-test, was utilized to determine the significance between two groups like gender, while One-Way Analysis of Variance (ANOVA) was used to determine the significance between two or more groups like year level taught, specialization, and age range of the selected respondents.

RESULTS AND DISCUSSION

In this research, descriptive and inferential analyses were conducted on a total of 16 Junior High School Science teachers from Mariano Ponce National High School and 9 from Virgen Delas Flores High School. The analysis focused on outlining the weighted mean, and standard deviation of the respondents. An Independent Sample T-Test and One Way Analysis (ANOVA) was utilized to identify any notable variances in the utilization of inquiry-based teaching approaches across the different stated variables.

Table 1. Demographic Profile In Terms of Gender

GENDER	FREQUENCY	PERCENTAGE
FEMALE	22	88%
MALE	3	12%
TOTAL	25	100%

Table 1 provides descriptive data on the frequencies and percentages of the demographic profile in terms of the biological sex of selected respondents. Based on the tabulated data, 22 or 88 % of the respondents were female and 3 or 12% were male. This means that most of the respondents are women.

Table 2. Demographic Profile in Terms of Grade Level Handled

GRADE LEVEL	FREQUENCY	PERCENTAGE
GRADE 7	7	28%
GRADE 8	6	24%
GRADE 9	6	24%
GRADE 10	6	24%
TOTAL	25	100%

The demographic profile of teachers in terms of grade level they handle is presented in Table 2. According to the descriptive statistics, the highest percentage of respondents is from the grade 7 with 28%. Additionally, the percentage of respondents from grade 8, 9 and 10 is equal at 24% . This means that majority of the teachers is handling Grade 7

Table 3. Demographic Profile in Terms of Specialization

SPECIALIZATION	FREQUENCY	PERCENTAGE
BIOLOGY	3	12%
BIOTECHNOLOGY	1	4%
CHEMISTRY	1	4%
GENERAL SCIENCE	14	56%
PHYSICS	5	20%
T.L.E	1	4%
TOTAL	25	100%

As shown on table 3 of the 25 teachers who participated in this study in terms of their specialization the highest is 14 or 56% of the respondents specialized in General

Science, furthermore 5 or 20% of the respondents specialized in Physics, 3 or 12% of the respondents specialized in Biology, and Biotechnology, Chemistry and T.L.E has equal number of respondents which is 1 or 4 %. It is also noticeable that there is 1 teacher who specializes in another subject that is handling Science.

Table 4. Demographic Profile in Terms of Age

AGE	FREQUENCY	PERCENTAGE
31-40	5	20%
41-50	8	32%
51-60	11	44%
61-65	1	4%
TOTAL	25	100%

Table 4 shows the frequencies of the profiles of the respondents according to age. Based on the tabulated data, it is observed that the lowest number of respondents, which is 1 teacher or 4%, falls within the age group of 61-65. On the other hand, accounting for 44%, are in the age group of 51-60. Therefore, out of the 25 teachers included in the study, most of the respondents are between the ages of 51 and 60.

Table 5. Teachers' Perception of the Use of Inquiry-based Learning Method

No.	Item Statement	Mean	SD	Verbal Interpretation
1	IBL instills confidence in the learner.	4.52	0.510	Strongly Agree
2	I think that IBL methods help my learners to develop experimental skills.	4.60	0.500	Strongly Agree
3	I think that IBL methods encourage learning by doing and learner's participation in designing their own learning experiences.	4.56	0.507	Strongly Agree
4	The IBL method encourages collaboration in science education.	4.68	0.476	Strongly Agree
5	I think that IBL enhance students' conceptualization and understanding and contextualization of contents in science	4.64	0.490	Strongly Agree
6	I believe that inquiry-based teaching methods encourage creativity, and innovative ideas of students	4.56	0.507	Strongly Agree

7	IBL encourages the use of open-ended tasks and practical activities that enhances retention rate.	4.56	0.507	Strongly Agree
8	I think IBL methods imparts problem-solving skills in learners and higher order thinking in natural science subjects.	4.52	0.476	Strongly Agree
	Overall	4.58	0.053	Strongly Agree

Rating: 4.51-5.00 Strongly Agree (SA); 3.51-4.50 Agree (A); 2.51-3.50 Neither Agree Nor Disagree (N); 1.51-2.50 Disagree (D); 1.00-1.50 Strongly Agree (SA)

Table 5 shows the teachers' perception of the use of inquiry-based learning methods as a teaching approach. Based on the tabulated data, item number 4 obtained the highest mean of 4.6 and a standard deviation of 0.490 with 'Strongly Agree' as its verbal interpretation for the statement, "IBL method encourages collaboration in science education." This agrees with the study of Main (2023), inquiry-based learning often involves group projects, fostering teamwork and collaboration. Through these interactions, students learn from each other, enhancing the collective learning experience. On the other hand, item numbers 1 and 8 got the lowest mean score of 4.52 and a standard deviation of 0.501 with a verbal interpretation of 'Strongly Agree' for the statements "IBL instills confidence in the learner." and "I think IBL methods imparts problem-solving skills in learners and higher order thinking in natural science subjects." respectively. The overall mean score is 4.58 with a standard deviation of 0.103 which implies that most of the respondents strongly agree on the use of the inquiry-based learning method as an approach in enhancing science education. This is supported by the study of Etienne (2022) which highlighted that the use of Inquiry-based learning was found to be particularly effective teaching approach in enhancing students' science performance. Similarly, Geletu's (2024) study revealed that utilizing Inquiry-Based Teaching (IBT) methods in secondary schools, leads to increased motivation in implementing these methods.

Table 6. *Challenges Encountered by Teachers in Inquiry-based Teaching Methods*

No.	Item Statement	Mean	SD	Verbal Interpretation
1	Teaching and learning that incorporates the inquiry tasks require enough materials including but restricted to the computer, infrastructures, libraries, and equipped laboratories.	3.96	0.790	Agree
2	Inquiry-based learning requires long time to	3.96	0.790	Agree

	prepare for teachers to facilitate each student during learning process.			
3	Large class size	4.08	0.812	Agree
4	Lack of creativity and innovation of teachers	3.56	1.158	Agree
5	Dominance of traditional lecture method over inquiry-based teaching methods	3.68	0.900	Agree
6	Insufficient regular workshop, pieces of professional trainings on teaching and learning methodologies are challenges towards implementation of IBL.	3.84	0.746	Agree
7	Ineffective cooperation and interaction between teaching staff members impede the implementation of inquiry-based learning in science subjects.	3.60	0.866	Agree
	Overall	3.81	0.186	Agree

Rating: 4.51-5.00 Strongly Agree (SA); 3.51-4.50 Agree (A); 2.51-3.50 Neither Agree Nor Disagree (N); 1.51-2.50 Disagree (D); 1.00-1.50 Strongly Agree (SA)

Table 6 shows the challenges encountered by teachers in inquiry-based teaching methods. As indicated in the above table 6, item number 3 got the highest average mean of 4.08 and a standard deviation of 0.812 with ‘Agree’ as its verbal interpretation for the statement, “Large class size.” This is evident in the study of Ogegbo et al. (2024) which believed that teachers with larger class sizes may face difficulties in implementing science investigations due to the challenges associated with managing a greater number of students, ensuring safety, and providing individualized attention during hands-on activities. The size of the class can directly influence the teacher's ability to effectively carry out inquiry-based teaching strategy.

Conversely, item number 4 got the lowest mean of 3.56 and a standard deviation of 1.158 with ‘Agree’ as its verbal interpretation for the statement” Lack of creativity and innovation of teachers.” This aligns with Yeboah et al. (2020) stating that in the inquiry method of teaching students must be provided with more hands-on activities to enable them discover facts and build on their pre-existing knowledge. Without teachers fostering creativity and innovation, the desired outcomes of the inquiry-based learning method may be impeded.

In summary, the overall mean score is 3.81 with a standard deviation of 0.186 with a verbal interpretation of ‘Agree’ which implies that most of the respondents’ experience challenges in integrating IBL to their lesson proper. According to Etienne et al (2024), the

implementation of IBL necessitates the effort of the academic community, particularly teachers, as they are directly concerned with instructions and their mode of delivery.

Table 7. Teachers' Perception Regarding IBL

No.	Item Statement	Mean	SD	Verbal Interpretation
1	Inquiry-based learning imparts problem-solving skills in learners through higher order thinking activities, which contribute to students' deep understanding of concepts in science subjects.	4.44	0.507	Agree
2	Inquiry-based learning is one of the learner-centered approaches where learners themselves construct knowledge under the guidance of teachers.	4.52	0.510	Strongly Agree
3	In an inquiry-based learning environment, the teacher allocates enough time for learners to deeply investigate and explore the tasks assigned using various resources such as textbooks, computers connected to the Internet, learning models and other learning materials.	4.52	0.510	Strongly Agree
4	Inquiry-based learning helps learners to connect theories to the living situations thus, equipping them with required competencies of the 21st century.	4.44	0.507	Agree
	Overall	4.48	0.04	Agree

Rating: 4.51-5.00 Strongly Agree (SA); 3.51-4.50 Agree (A); 2.51-3.50 Neither Agree Nor Disagree (N); 1.51-2.50 Disagree (D); 1.00-1.50 Strongly Disagree (SD) as

The result in Table 7 indicates the overall perception of science teachers regarding the inquiry-based learning methods. Both Items 2 and 3 attained a weighted mean of 4.52 interpreted as 'Strongly Agree'. The statement for item number 3 agrees with the study of Preston (2023), inquiry-based learning is a student-centered teaching method that encourages students to ask questions and investigate real-world problems. Similarly, the statement for item number 4 is supported by the article of Llego (2022), citing that the role of the facilitator in an inquiry-based classroom is to assist students in asking good

questions, locating relevant information, and interpreting what they discover. The result also shows that both items 1 and 4 got a mean of 4.44 with an interpretation of 'Agree' for a statement, "Inquiry-based learning imparts problem-solving skills in learners through higher order thinking activities, which contribute to students' deep understanding of concepts in science subjects." and Inquiry-based learning helps learners to connect theories to the living situations thus, equipping them with required competencies of the 21st century.

In summary, the overall mean of the overall teachers' perception regarding IBL got 4.48 with a standard deviation of 0.04 with a verbal interpretation of 'Agree'. This indicates that most of the respondents concur that the use of inquiry-based learning methods is beneficial in enhancing the junior high school students' essential science skills.

Table 8. Teachers' Perception On the use of IBL methods when analyzed by gender

Use of inquiry-based teaching methods	Statistic	GENDER					Decision
		df	P Value	Mean difference	SE difference	Interpretation	
	-0.155	23.0	0.878	-0.0421	0.272	HIGHLY SIGNIFICANT	DO NOT REJECT H0

Based on the tabulated data, table 8 shows that the Sig. (2-sided) for Independent Samples t-Test with a p-value of 0.878 is greater than the typical significance level of 0.05, the statistical interpretation leads to a non-significant result. The decision based on this analysis is to not reject the null hypothesis, suggesting that there is no significant difference on the assessment of junior high school science teachers on the use of inquiry-based teaching methods when analyzed by gender. In the study conducted by Yeboah et al. (2020), it was found that gender is not a significant factor in students' performance when using the inquiry method of teaching. The study revealed that there was no statistically significant difference between the performance of male and female student-teachers in general chemistry. Therefore, it is reasonable to conclude that gender does not play a significant role in how junior high school science teachers perceived the use in the implementation of inquiry-based teaching methods.

Table 9. Teachers' Perception On the use of IBL methods when analyzed by Year Level

USE OF IBL						
GRADE LEVEL TAUGHT	F	dF1	dF2	P-value	INTERPRETATION	DECISION
	10.5	2	11.0	0.001	HIGHLY SIGNIFICANT	REJECT HO

Table 9 results show that Sig. one-way ANOVA with a p-value of 0.001 is less than the typical significance level of 0.05, the statistical interpretation leads to a highly significant result. Indicate that there is a highly significant difference on the assessment of junior high school science teachers on the use of inquiry-based teaching methods when analyzed by year level taught. Therefore, the decision based on this analysis is to reject the hypothesis. The findings revealed that the perception and interpretation of the use of the inquiry-based learning method varied significantly depending on the year level being taught. This suggests that the impact and suitability of implementing IBL teaching methods in science education differ among teachers based on the specific year group they are instructing. Theory suggests that the level of cognitive demand and complexity of inquiry tasks may need to be adjusted based on the students' grade level. By aligning the design of inquiry-based learning tasks with the cognitive levels appropriate for each grade level, teachers can ensure that students are challenged at an appropriate level and can effectively develop their critical thinking and problem-solving skills through the inquiry process

Table 10 Teachers' Perception On the use of IBL methods when analyzed by Specialization

USE OF IBL					
Specialization	Pearson's r	df	P-value	INTERPRETATION	DECISION
	10.5	2	0.605	NOT SIGNIFICANT	DO NOT REJECT HO

Table 10 results show that with a p-value of 0.605 is greater than the typical significance level of 0.05, the statistical interpretation leads to a non-significant result. Therefore, the decision based on this analysis is not to reject the hypothesis. The finding

revealed that in the context of teachers' perception regarding the use of IBL method analyzed by specialization, the outcomes implies that there is not enough evidence to reject the hypothesis. According to analysis conducted, there is no clear indication that teachers' specialization affects the effectiveness or the use of IBL methods in their teaching practice. Therefore, the use of IBL does not significantly vary based on their specialization.

Conclusions

This study aims to investigate science teachers' use of inquiry-based teaching methods in teaching junior high school science among select secondary schools in Baliwag. Therefore, the researchers have drawn the following conclusions:

1. The gender and the specialization of the selected Junior High School science teachers does not significantly affect their perception on the use of inquiry-based learning methods in the teaching and learning process,
2. The perception and interpretation of the use of the inquiry-based learning method in terms of year-level taught by the science teachers is highly significant.
3. The science teachers positively perceived the use of inquiry-based learning methods in improving students' science essential skills such as collaboration, conceptualization and understanding and contextualization of contents in science, experimental skills, etc.
4. The science teacher encountered challenges in implementing the IBL particularly in large class size, availability of materials, lack of professional training, etc.
5. The overall perception of the science teachers towards IBL is that it indeed make the students the center of science education and the teacher is the facilitator, guiding the students to the 21st century essential skills.

Recommendations

Considering the research findings, it is recommended that the Division office and Supervisors of educational institutions provide training and other learning opportunities for the teachers to uplift their knowledge about Inquiry-Based Learning. Teachers should also be provided with workshops to enhance their skills in implementing this teaching method that address the challenges that arise such as Large Class Size, Availability of resources, constrained time. Insufficient trainings and others. The following specific recommendations are provided:

1. Implementation of the Inquiry-Based Learning:

Schools are encouraged to continually implement Inquiry-Based Learning methods in teaching science in the classrooms, ensuring proper training for teachers on its effective utilization is encouraged.

2. Professional Development for Educators:

Develop and implement professional programs to train educators in the effective use of the Inquiry-Based Learning such as workshops, training sessions or mentorship to address challenges that teachers faced in implementing IBL in Large Class Size and any other challenges teachers may face during the implementation.

3. Monitoring and Evaluation:

Establish a monitoring and evaluation system to track the performance of the students during the implementation or integration of the Inquiry-Based Learning Method over time.

4. Develop Resources and Support Resource Allocation:

Provide support for educators by allocating sufficient resources, both financial and technical, to support the widespread implementation of Inquiry-Based Learning Method.

Aside from the recommendation mentioned above, Future researchers can also use the result of this study to explore other areas of Inquiry-based learning. They can dig into the student's perspective regarding the implementation of Inquiry-based learning in their science class, its impact and challenges related to it for a better understanding of the phenomena that can help the teachers, curriculum developer, and other implementer to develop a program to that supports the use of IBL teaching method. By implementing these recommendations, educational institutions can dig deeper into the potential of the Inquiry-Based Learning Method in enhancing scientific literacy and harnessing the 21st century skills of learners in their learning experiences and academic achievements in science.

Compliance with Ethical Considerations

Ethical considerations play a critical role in ensuring the integrity and respect for the participants. In this study, a letter of intent to conduct a survey was given to the research coordinator, the subject coordinator and the principal of the institution to seek their permission to conduct the survey. The letter contains the purpose of the study, the process involved and how the data will be utilized. Attached sample of the questionnaire was also given for them to review its content. This was done to assure the institution as well as the respondents that the study will be ethically done in accordance to their institutional guidelines.

Additionally, voluntary participation is also considered. Teachers have the freedom to decide whether they want to be involved in the research or not. More so, the names and any confidential data coming from the respondents were highly respected and will be put in observance of privacy. In adhering to the ethical consideration and to prioritize the confidentiality and privacy of the respondents, disposing of the survey questionnaire through shredding is a responsible practice. After collecting the data, information provided from the questionnaire should be handled with care to protect the anonymity of the

respondents. After obtaining Any literature and related studies that were used in this study were referenced and cited in an APA format.

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