INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY: APPLIED BUSINESS AND EDUCATION RESEARCH
2025, Vol. 6, No. 7, 3554 – 3566
http://dx.doi.org/10.11594/ijmaber.06.07.25

Research Article

Science Literacy among The Bachelor of Elementary Education Students at Osias Colleges Inc.

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Article history:
Submission 03 June 2025
Revised 31 June 2025
Accepted 23 July 2025

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ABSTRACT

The purpose of this study was to investigate science literacy among the Bachelor of Elementary students at Osias Colleges Inc. The study employed a descriptive research design to describe science literacy among 50 students of Bachelor of Elementary Education.

Science literacy was evaluated using indicators namely: recognizing scientific questions, identifying evidence, drawing conclusions, communicating conclusions, and demonstrating an understanding of scientific concepts. The results showed that the science literacy level of the students is described as "beginning".

In this regard, strategies and activities are proposed for each of the five science literacy indicators. Since the science literacy level of the BEED students is described as "beginning", it is recommended that the College of Education should provide an entrance examination to first-year students particularly in the field of science education. Additionally, teachers should incorporate technology in learning to assist students who are struggling with science literacy and provide extra resources to help them improve their understanding of scientific concepts. The proposed strategies and activity cards may be implemented to raise the students science literacy level.

Keywords: *Recognizing scientific questions, Identifying evidence, Drawing conclusions, Communicating conclusions, Science concepts*

Background

The researcher, as an educator in the field of science, is deeply troubled by the consistently low scores and poor performance of BEED students in science subjects. To tackle this issue,the researcher implemented various teaching strategies, including inquiry-based learning, collaborative learning, and the integration of technology to enhance students' understanding. Additionally, the researcher also used real-life examples to help students relate

How to cite:
Anchiboy, J. T. (2025). Science Literacy among The Bachelor of Elementary Education Students at Osias Colleges Inc. *International Journal of Multidisciplinary: Applied Business and Education Research*. *6*(7), 3554 – 3566. doi: 10.11594/ijmaber.06.07.25

to the scientific concepts being taught. However, despite the efforts, the researcher has observed that many first-year BEED students, and a few second-year students, struggled with remembering scientific terms and concepts, as well as applying them in practical essay questions. This suggests that they are finding it challenging to comprehend and apply the concepts taught to them. There could be several reasons, such as a lack of interest in the subject, ineffective teaching methods, and difficulty in grasping abstract concepts. Additionally, inadequate instruction in science during their earlier years in education could also be a factor. Science literacy is built on a robust foundation of knowledge and skills, and without adequate instruction, students may struggle to catch up in later years.

Therefore, it is of the utmost importance for elementary school science teachers to provide a high-quality education. This is crucial for establishing a solid foundation in scientific thought and equipping students with the skills needed to comprehend complex scientific concepts. As a member of the science faculty at Osias Colleges Inc., the researcher conducted this study to determine the Science Literacy levels among the BEED students at Osias Colleges Inc. Through this study, the researcher hoped to gain valuable insights that can contribute to the overall advancement of science literacy among future teachers at said institution.

Methods

Subsection 1

The descriptive research design is used to describe and summarize the characteristics of a particular population or sample, particularly in science literacy. This can involve collecting data on demographic variables such as students' academic performance and the secondary school from which they graduated. Descriptive research is used to provide a comprehensive and factual description of the science literacy levels of BEED students which involves qualitative data.

Subsection 2

The researcher utilized an adapted questionnaire based on the test of Scientific Literacy (TOSL), which was originally developed by the Program for International Student Assessment (PISA) in 2018. The TOSL is a standardized test that measures students' understanding of scientific concepts, their ability to use scientific reasoning and evidence to solve problems, and their awareness of the nature and limitations of science. The questionnaire consists of 40 multiple-choice items, with each item having four answer options. The questions cover a range of scientific topics, including physics, chemistry, biology, and earth science, as well as topics related to science and technology in society. In addition, the questionnaire was adjusted to emphasize scientific concepts aligned with the Philippine K-12 curriculum, considering the professional path of BEED students as future elementary educators. The language of the items was also simplified for clarity and accessibility, particularly for students with varying levels of English proficiency, while still preserving the integrity and accuracy of the scientific content.

Result and Discussion

The study includes 50 Bachelor of Elementary Education (BEED) students from Osias Colleges, Inc., and the secondary school from which they graduated, including their grades when they were in high school.

1. Academic Performance

Education is essential not only for the advancement of an individual but also for the growth of the community and nation. To bring improvements in all areas and to employ modern and innovative techniques and methods, individuals must raise awareness and improve their educational abilities.

According to Chakraborty (2017), academic performance encompasses the outcomes of a student's educational journey, reflecting their competence in mastering subject matter and applying it effectively.

There are numerous internal and external factors that influence the academic performance of secondary school students. Internal factors include students' motivation, study habits, and time management. External factors can encompass the quality of teaching, class

sizes, and parental involvement in students' education. School factors such as the quality of educational resources, curriculum, and teaching methods can significantly contribute to a student's academic performance. (Ginsburg, et al, 2017).

Academic performance is classified into four levels in the context: Outstanding, Very Satisfactory, Satisfactory, and Fairly, with percentage distributions for each.

Table 1 shows the academic performance distribution of 50 BEED students at Osias Colleges Inc. in their secondary level.

The "outstanding'' category represents 8% of the students. It is a notable achievement and reflects exceptional academic performance. It also indicates that a significant portion of the student consistently excel in their studies and demonstrate a deep understanding of the subject matter.

The majority of the students fall into the " very satisfactory" category, which makes up 74 %. This indicates that the students' academic performance is above average. Furthermore, 18% of the students obtained a " satisfactory" rating, indicating that a sizable portion of the students are meeting the expected academic standards. Notably, no students are classified as "fairly," implying that none of the students fall below the "satisfactory" range.

Table 1. Performance in Secondary School

Description	Equivalents	Frequency	Percentage
Outsanding	90-100	4	8%
Very Satisfactory	85-89	37	74%
Satisfactory	80-84	9	18%
Fairly	75-79	0	0%
Total		50	100

2. School Graduated

Students in the Philippines have the option to attend either public or private schools, and their choice are influenced by various factors. San Diego and Capilitan (2017) note that parents often believe that private school offer higher academic standards, including more rigorous curricula and qualified teachers. According to Reyes et al., (2020), peer groups and the social environment of a school can heavily influence the decision-making process.

Public school, which are government-funded, are preferred choice for many Filipino families due to their affordability. In contrast, private school offer specialized programs, ranging from international to religious-based education, catering to specific interest and needs. Some private schools are perceived to offer higher-quality education due to better facilities, more resources, and well-qualified teachers. According to Gonzales (2023), long commutes can be extremely inconvenient, so geographic proximity to a school remains an important factor in selecting a school.2.

Table 2. School Graduated

Indicator	Frequency	Percentage
Public	31	62%
Private	19	38%
Total	50	100%

Table 2 shows the distribution of BEED students between public and private schools from which they graduated. Within the given context, it is observed that 62% of the students who participated in the survey graduated from public schools, whereas the remaining 38% graduated from private schools. A sizable proportion of students in the study prefer public

education. Financial considerations continue to play a significant role in school choice. According to Biraimah (2019), public schools remain a popular choice for families seeking cost-effective education, while private schools often attract those willing to invest in a perceived quality advantage.

3. Recognizing the Scientific Question

In the process of learning science, students need to develop the ability to recognize scientific questions. The ability denotes the skill of recognizing and formulating questions that are amenable to being answered through scientific investigation. A question can be considered scientific if it is amenable to investigation in the form of observations, experiments, or other types of data gathering and analysis that can lead to the acquisition of new information and a deeper comprehension of natural phenomena.

The capacity to identify scientific questions is a crucial component of scientific proficiency, as it empowers individuals to participate in critical thinking and decision-making processes, and to assess assertions and reasoning grounded in scientific facts or evidence. The ability to instruct students in the identification of scientific questions is a fundamental competency for educators. The acquisition of this skill enables students to participate in analytical thinking and the resolution of complex issues, which is fundamental to scientific literacy and eventual triumph in science-oriented professions.

In science, open-ended queries can facilitate the development of hypotheses, the design of experiments, and the analysis of data. It can assist individuals in comprehending how scientific discoveries are created and how knowledge evolves with time.

The importance of developing scientific inquiry skills, including the ability to ask questions, is an important aspect of science literacy, and students who can ask scientific questions tend to have a higher science literacy level (Liu, 2018).

Table 3. Recognizing the Scientific Question

Questions	Mean	Verbal Description
You notice that your friends's phone battery seems to run out faster when it's cold outside. Which of the following is a scientific question you could ask to investigate the phenomena?	72	Beginning
You're hiking in the woods and see a plant with large, shiny leaves and small white flowers. Which of the following is a scientific question you could ask to learn more about this plant?	22	Beginning
You're watching a thunderstorm and notice that lightning always comes before thunder. Which of the following is a scientific question you could ask to understand this sequence?	62	Beginning
You notice that your friend's gold necklace looks different from your own gold necklace, even though they are made of the same metal. Which of the following is a scientific question you could ask to explain this difference?	50	Beginning
Which of the following is a scientific question related to wind wheel and bikes?	84	Approaching Proficiency
Which of the following is a scientific inquiry question related to the periodic table of elements?	52	Beginning
Grand Mean	**57**	**Beginning**

As shown on Table 3, it can be inferred that students were able to recognize the scientific question "Which of the following is a scientific question related to wind wheels and bikes? (84) described as approaching proficiency. This shows that BEED students have a basic

understanding about physics concepts and principles that to identify and formulate scientific questions related to wind wheels and bikes. The question "You're hiking in the woods and see a plant with large, shiny leaves and small white flowers. Which of the following is a scientific question you could ask to learn more about this plant? Got the least (22). BEED students were not able to recognize the scientific question related to biology. The questions, however, were verbally described as beginning, implying that students may not have sufficient background knowledge in a given science concept and may not fully understand how to develop scientific questions.

BEED students' limited ability to recognize scientific questions suggests that they may struggle to guide young learners in formulating their own scientific inquiries, which is an essential feature of constructivist and inquiry-based science teaching. This weakness may stem from two interrelated issues. First, insufficient background knowledge in certain areas of biology. Second, the limited practice in asking or evaluating questions from a scientific perspective. Moreover, students' responses falling within the "beginning" (mean scores between 50 to 72) emphasize a pattern of underdeveloped inquiry skills. This indicates challenges to their readiness to deliver effective science instruction aligned with the K-12 Science Curriculum, which emphasizes exploration, investigation, and guided discovery at the elementary level.

4. Identifying the Evidence

Identifying the evidence is the process of collecting data or information that can be used to evaluate a student's science literacy level. It entails collecting data that provides insight into a student's comprehension of scientific concepts, ability to employ scientific methods and skills, and capacity to effectively communicate scientific information. Identifying evidence is a key component that enables individual to evaluate claims and arguments that require critical thinking skills. These skills are not only important in science but also in different aspects of life, such as decision-making, problem-solving, and communication. As students learn to identify evidence, it allows them to engage in discussions and make decisions about science-related issues.

These skills will improve a person's ability to interact and communicate with others. According to Adams and Hollebrands (2020), a physics education that places an emphasis on problem-solving, critical thinking, and quantitative analysis can better equip students to traverse the complex scientific and technical issues that exist in a world that is always evolving.

According to DeBoer (2019), students who are interested in pursuing professions in science and engineering would benefit greatly from taking physics classes because the subject plays an important part in a variety of new and developing sectors, including renewable energy, nanotechnology, and space exploration.

Inquiry-based science instruction aims to support students to acquire scientific knowledge by conducting their own scientific experiments and adopt a critical way of engaging with science (Mostafa,et al.,2018). This type of teaching practice involves a wide range of student-initiated activities including authentic and problem-based learning activities, experimental procedures, experiments and hands-on activities, self-regulated learning sequences, discursive argumentation and communication with peers (Costa et.al, 2018).

Inquiry-based teaching emphasize student autonomy, communication and collaboration by exposing students to scientific procedures in the classroom. In this sense, it allows students to direct their own teaching with the objective that they develop a genuine interest in science and its subjects (OECD, 2018).

Inquiry-based teaching is found to be particularly important in teaching physical and life sciences (OECD, 2016), and has long been promoted at European level as bearing the potential to increase interest in science and stimulating teacher motivation (Rocard, et al., 2007).

Table 4. Identifying the Evidence

Questions	Mean	Verbal Description
Why does the book resting on a table demonstrate the concept of inertia?	94	Advanced
How does the study of gravitational waves provide scientific evidence for the existence of black holes?	66	Beginning
Which of the following scientific evidence supports the idea that climate change is occurring and caused by human activity in the Philippines?	38	Beginning
Why does stainless steel spoon feel colder than a plastic spoon?	48	Beginning
Cheska measures her weight on a weighing scale as shown. What is her weight?	44	Beginning
What is the height of the boy ?	28	Beginning
Which is best for measuring the amount of liquid a large pitcher can hold?	78	Developing
Grand Mean	**56.57**	**Beginning**

Table 4 shows that students exhibited an excellent comprehension of the principles discussed with the question, "Why does the book resting on a table demonstrate the concept of inertia? (94) is described as advanced. This shows that they understand physics concept and able to apply this knowledge to real-world situations. Advanced level of science literacy enables students to think critically and creatively about science concepts and ideas. This allows students to make informed decisions and take action on complex issues that affect their lives and their communities. According to Flick and Bell (2018), physics is a key component of 21st-century skills and scientific literacy because it lays the groundwork for developing an understanding of the physical world and the ways in which it interacts with other natural events. Furthermore, students displayed a fundamental understanding of the topic covered in the question "Which is best for measuring the amount of liquid a large pitcher can hold? (78) with a verbal description, developing. BEED students were able to recognize the different measuring instruments. To develop science literacy, it is important to engage in active learning strategies that involve inquiry-based activities, such as conducting experiments, analyzing data, and solving problems. BEED students were not able to read the height of the boy illustrated in the picture, this shows that they have difficulty reading measurements, in the question "What is the height of the boy?", which is evident for getting the least mean (28).

On the other hand, the fact that the grand mean was 56.57 indicates that students have a difficult time comprehending scientific concepts and that they require additional assistance to develop their skills. The Beginning level emphasizes how important it is for them to improve their degree of science literacy. It is important for the students to engage in active learning strategies that involve inquiry-based activities, such as conducting experiments, analyzing data and solving problems. BEED students are conducting hands-on science experiences inside their classrooms, and they are bringing their own resources. According to Mercurio et al. (2021), laboratories and technology are important components of science literacy for improving science education.

The findings of this study reveal the mixed performance among BEED students. While there is evidence of strong conceptual understanding in physics-related questions, particularly those rooted in familiar, real-world scenarios, their overall performance reflects a concerning weakness in interpreting quantitative data, reading measurements, and analyzing visual scientific representations. Embedding inquiry-based teaching strategies, increasing exposure to hands-on measurement tasks, and

systematically incorporating data interpretation exercises can help bridge the gap. These approaches will not only strengthen students' science competencies but also empower them to become confident students as they master the ability to identify and evaluate scientific evidence; they will become better equipped to show curiosity, scientific thinking, and analytical reasoning in young learners. This ripple effect will help the overall quality of science subjects in basic education, promote lifelong science literacy, and prepare a generation of students who can do an increasingly complex, data-driven world.

5. Drawing Conclusions

In order to identify students' degree of competency in scientific knowledge and abilities, it is essential to critically analyze and interpret the evidence gathered during assessments. This is done by drawing conclusions.This involves analyzing data, evaluating evidence and making inferences based on the available information. Students who are proficient in drawing conclusions can assess scientific claims and theories critically and will be able to distinguish reliable and unreliable sources of information and make decision based on evidence. They can also analyze patterns in scientific data to draw conclusions, as well as analyzing scientific evidence to identify the cause and effect relationships.

In the study of Krisyasari et.al (2018), among the five indicators of science literacy the male students are only able to master one indicator which is drawing a conclusion. This finding suggest that male students may have a relative advantage in the cognitive skill of drawing conclusion, which requires synthesizing information and forming evidence-based inferences. It is crucial to highlight, however, this does not mean that all male students are better at drawing conclusions than female students.

Table 5. Drawing Conclusions

Questions	Mean	Verbal Description
In some fishes, baby fishes are seen to come out of the male's mouth . Which of the following explains this observation?	76	Developing
A student conducted an experiment to test the effect of temperature on the rate of enzyme activity. Which of the following conclusions is best supported by the data?	68	Beginning
A scientist analyzed data from a study on the effects of air pollution on respiratory health. Which of the following conclusions is best supported by the data?	80	Approaching Proficiency
A student observes that a plant grown in bright sunlight grows taller than the same type of plant grown in a shaded area. What conclusion can be drawn from this observation?	94	Advanced
A student heats a sample of copper wire until it turns black. What conclusion ca drawn from this observation?	20	Beginning
When people travel to his places, they feel their ears pop or crack. Why?	32	Beginning
A liquid rises in the medicine dropper after releasing a squeezed rubber bulb. Why does this happens to the liquid?	34	Beginning
The drawing shows the muscles of the leg when the knee bends. What happens to muscle A and muscle B to make the knee bend?	46	Beginning
What force is acting on the ball?	38	Beginning
Grand Mean	54.22	**Beginning**

Table 5 shows that the fourth question asks about the conclusion that can be drawn from the observation that a plant grown in bright sunlight grows taller than the same type of plant grown in a shaded area. (94), interpreted as advanced level. This indicates that certain students are highly familiar with regards to plants. It may be prior knowledge about science concepts or based on their experience as they deal with plants.

The third question asks about the effects of air pollution on respiratory health based on a study got the second highest. (80) interpreted as approaching proficiency shows that BEED students were able to explain the observations because they know science concepts. These students were able to identify the effects of pollution to the respiratory system, an indication of their knowledge about the structure, function, and underlying physiological processes of the respiratory system.

The question " In some fishes, baby fishes are seen to come out of the male's mouth . Which of the following explains this observation? is described as "developing," which suggests that some students still need guidance and assistance in order to advance their science skills. It is having a basic understanding of scientific concepts and principles and be able to apply critical thinking skills to analyze and interpret scientific information. Meanwhile, the fact that the grand mean was 54.22, with a verbal description of beginning, suggests that the majority of the students have a limited ability to draw conclusions. Some factors that influence students' ability to reason scientifically include prior knowledge, metacognitive awareness, and language proficiency (Zaman,2020); cultural background and socioeconomic status affect students' ability to conclude (Ramirez,2018). As future elementary educators, their limited ability to interpret data and draw accurate conclusions may hinder their effectiveness in teaching science through inquiry-based approaches, as emphasized in the K-12 Science Curriculum. In response to the learning gaps, it is crucial to integrate simple hands-on experiments and demonstrations within the classroom, using low-cost or recycled materials. These activities allow students to engage directly with observations and practice forming conclusions even without a formal laboratory setting. Another is incorporating everyday local phenomena into lessons, such as climate-related issues, agriculture, or pollution, that can enhance student engagement and help them apply science to real-life contexts. These strategies aim to support BEED students' ability to draw meaningful conclusions from data, interpret scientific observations with confidence, and become effective, inquiry-driven teachers. These skills will not only elevate their scientific literacy but also the learners they will teach will grow up equipped with curiosity, reasoning ability, and critical thinking.

6. Communicating the Conclusion

A crucial component of determining a student's level of science literacy is communicating the conclusions. It requires having the capacity to communicate scientific concepts and discoveries to people in an effective manner while utilizing terminology and language that are appropriate for the field of study. Students need to communicate the conclusions since doing so enables them to show that they comprehend scientific theories and concepts and that they clearly express their ideas.

According to the National Science Board (2018), Science literacy encompasses not only the ability to read and understand scientific information but also the ability to communicate scientific ideas and conclusions to others.

Table 6. Communicating the Conclusion

Questions	Mean	Verbal Description
Based on the observation that a plant is wilting and the soil is dry, what conclusion can be drawn about the plant's water uptake?	70	Beginning

Questions	Mean	Verbal Description
After studying the migration patterns of birds, what conclusion can be drawn about the reason for their seasonal movements?	74	Beginning
After conducting an experiment to test the effect of temperature on enzyme activity, what conclusion can be drawn if the results show that the rate of reaction decreased as the temperature increased?	56	Beginning
Based on the observation that a metal rod becomes hotter when one end is held over flame, what conclusion can be drawn about heat transfer?	72	Beginning
The diagram below shows an example of interdependence among aquatic organisms. During the day the organisms either use up or give off (a) or (b) as shown by the arrows.	56	Beginning
A liquid rises in the medicine dropper after releasing a squeezed rubber bulb. Why does this happen to the liquid?	32	Beginning
Two glasses A and B are filled with tap water. Ice cubes are placed in glass A. What will you observe after a few minutes?	40	Beginning
Tropical rainforests have many trees and other plants that photosynthesize. What happens when huge areas of tropical rainforests are destroyed?	78	Developing
Grand Mean	**59.75**	**Beginning**

Table 6 reveals that the overall mean score of 59.75 indicates that, on average, the respondents have a beginning level of understanding when it comes to scientific reasoning skills. This indicates that there is room for improvement in science literacy, specifically in the ability to draw conclusions based on observations, experiments, and ecological phenomena.

The first question asks about the conclusion that can be drawn about a plant's water uptake based on the observation that is writing and the soil is dry. (70) indicates a beginning level of understanding. The question requires an understanding of the relationship between water availability and plant health.

The second question asks about the conclusion that can be drawn about the reason for the seasonal movements of birds based on the study of their migration patterns. (74) indicates a beginning level of understanding. The student needs to understand the factors that drive bird migration.

The third question asks about the conclusion that can be drawn from an experiment that tested the effect of temperature on enzyme activity. The results showed that the rate of reaction decreased as the temperature increased. (56), indicating a beginning level of understanding.

The fourth question asks about the conclusion that can be drawn about heat transfer based on the observation that a metal rod becomes hotter when one end is held over a flame. (72), It indicates a beginning level of understanding. This question requires an understanding of the transfer of heat from one object to another.

The fifth question asks about the interdependence of aquatic organisms based on a given diagram. (56) is also interpreted as a beginning level of understanding. This question necessitates knowledge of the interrelationships between aquatic organisms and their mutual effects.

The sixth question asks why a liquid rises in a medicine dropper after releasing a squeezed rubber bulb. (32) is similarly described as a beginning level of understanding. This requires knowledge of the physical properties of liquids and their behavior under pressure.

The seventh question asks what will be observed after placing ice cubes in a glass of tap water. (40) indicates a beginning level of understanding. This question requires an understanding of the relationship between temperature and water.

The last question asks what happens when huge areas of tropical rainforest are destroyed. (78) indicates a verbal description of developing, which means that students have a moderate degree of communication and science literacy skills. Students who answered the question correctly likely have a fundamental understanding of scientific concepts, but may require additional training to express them explicitly. BEED students write daily reflections to improve their writing skills and effectively communicate scientific concepts. Students were also allowed to present to effectively communicate their ideas orally and hone their speaking abilities.

Chang, C.Y et. al (2018) discovered that collaborative activities improved students' ability to communicate scientific information, leading to communication skills. Group activities inside the classroom can help students develop communication skills by working together. Students were hesitant to communicate their scientific ideas if they lacked confidence in their knowledge.

The implications of these " Beginning" level performances are critical. BEED students must develop the ability to guide learners through scientific investigations that involve observing, hypothesizing, and drawing evidence-based conclusions. Weak scientific reasoning skills may limit their ability to facilitate inquiry-driven instruction and could lead to rote-based teaching strategies in the future. BEED students may struggle to implement the K-12 Science Curriculum, which emphasizes critical thinking, problem-solving, and real-world application. This could undermine students' confidence in teaching science, which this research shows is a key determinant of teaching effectiveness.

7. Demonstrating and Understanding of Scientific Concepts

The demonstration of a profound understanding of scientific concepts transcends mere memorization of facts and definitions. It is a multifaceted skill that requires the ability to connect these concepts, recognize intricate patterns and relationships, and apply this knowledge competently in a variety of contexts. When students have a firm grasp of scientific principles, they can explain the underlying mechanisms and causes of natural phenomena. In addition, they can support their explanations with credible scientific evidence, thereby strengthening their arguments and conclusions. In essence, this level of comprehension enables students to describe not only the "what" but also the "how" and "why" of the natural world, fostering a more robust and all-encompassing scientific perspective.

Supporting students as they show and understand scientific ideas is an important part of teaching science. Several strategies and methods can help students understand and use scientific principles. Some of these are having students do hands-on experiments, using visual aids and models, using metaphors and analogies to connect ideas to real-life situations, using real-life examples and case studies, encouraging concept mapping for better knowledge organization, encouraging group discussions and peer teaching, using the Socratic method for critical thinking, combining technology and simulations, and gamification to make learning fun.

Table 7. Demonstrating and Understanding of Scientific Concepts

Questions	Mean	Verbal Description
Which characteristic is shared by all cells?	70	Beginning
What would happen if earth's orbit and the Moon's orbit were in the same place?	42	Beginning
Why does the leaf of a plant look green?	52	Beginning

Questions	Mean	Verbal Description
Which sequence best identifies the energy transfers that take place within the flashlight to produce light?	42	Beginning
Which of the following statements is true about the orbits of planets around the Sun?	56	Beginning
Which is NOT needed for fire to occur?	68	Beginning
Which two objects produce their own light?	68	Beginning
Which of the following describes condensation?	42	Beginning
During freezing, melting and boiling, water changes from one state to another state. Heat needs to be supplied for which of these to take place?	70	Beginning
A metal spoon and a wooden spoon are used to stir a pot of hoy soup. After a few minutes, the metal spoon feels hotter than the wooden spoon.	60	Beginning
Grand Mean	**57**	**Beginning**

Table 7 displays the results based on students' ability to understand and demonstrate scientific concepts. The questions presented in the study cover a range of topics, from basic scientific knowledge to more complex concepts.

The highest-scoring question, with a mean score of 70, is "Which characteristic is shared by all cells?", indicating that students have a beginning level of understanding of this basic biological concept. All cells have a cell membrane, cytoplasm, and genetic material. Understanding cells is a key component of science literacy. According to Oliver et.al (2018), Students can improve their understanding of cells by engaging in hands-on activities, such as microscope investigations and cell modeling.

On the other hand, the question "Which sequence best identifies the energy transfers that take place within the flashlight to produce light?" (42) suggests that students have a beginning level of understanding in this area. This question assesses understanding of energy transfer and conversion in a simple circuit. To improve understanding of this concept, students can review the basics of electrical circuits, including voltage, resistance, and current. Students were also encouraged to engage in hands-on activities, such as building circuits and investigating how different components affect the flow of electricity. (NSTA, 2021).

The grand mean of 57 indicates that overall, students have beginning to proficient level of understanding in science literacy based on the questions presented. However, it is worth noting that the proficiency level, such as " during freezing, melting, and boiling, water changes from one state to another state. Heat needs to be supplied for which of these to take place?"(70), indicates that students may struggle with more complex scientific concepts.

Table 8. Summary Table on Science Literacy

Indicator	Grand Mean	Verbal Description
1. recognizing the scientific question	57	Beginning
2. identifying the evidence	56.57	Beginning
3. drawing conclusion	54.22	Beginning
4. communicating the conclusion	59.75	Beginning
5. demonstrating and understanding of scientific concepts	57	Beginning
Overall Grand Mean	**56.91**	**Beginning**

Table 8 shows the summary of student performance on five scientific literacy indicators: recognizing scientific questions, identifying evidence, drawing conclusions, communicating

conclusions, and demonstrating scientific concepts. The overall grand mean of 56.91 reveals BEED students at the " Beginning" level. This consistent pattern of low scores suggests that students have limited experience with inquiry-based science, evidence evaluation, and scientific communication skills essential for effective teaching in the K-12 classroom. The results highlight the urgent need to strengthen teacher education by incorporating more interactive, hands-on learning experiences, reasoning tasks, and opportunities for authentic scientific exploration that mirror the expectations of the K-12 science curriculum.

Conclusion

The following conclusions were drawn based on the findings:

1. The majority of the respondents academic performance is 74 % described as beginning . They graduated in public secondary school.
2. The science literacy among the Bachelor of Elementary Education students of Osias Colleges Inc. is described as "beginning"in recognizing the scientific questions; identifying the evidence; drawing conclusions; and demonstrating and understanding of scientific concepts.
3. Strategies and activities are suggested to be employed in educational institutions to raise the students science literacy levels.

Acknowledgement

I am filled with gratitude towards God Almighty for the abundance of grace, love, and mercy that has brought together a group of talented and generous individuals who have dedicated their time and effort to help me complete my study.

To Dr. Aurea C. Salagan, my thesis adviser, for providing me with guidance and consistent encouragement to pursue this study.

To Dr. Lilia M. Santiago, Dean of the Graduate School and Chairman of the Panel, for her illuminating leadership and ardent guidance all throughout the study.

To the members of the panel defense, Dr. Robert E. Osongco, Sir Nelson Calderon, and \ Ms. Rubylyn Fajardo, for imparting their expertise, suggestions, and recommendations.

To my mother for her understanding and boundless kindness.

To my sister, who is always there to lift my spirits and provide for my needs.

To my dear Torio family for their presence and moral support.

To my ICOC Family for their support through prayers and spiritual guidance.

To my friends and colleagues for their help and inspiration.

To all the participants in my study. Thank you for your time and cooperation.

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