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Scientific Literacy and Critical Thinking Ability of Grade 9 Junior High School Students

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Abstract — The study aimed to determine the profile of the respondents in terms of sex and age, evaluate the level of scientific literacy and critical thinking ability, and propose a learning development plan to enhance these skills. The descriptive research method was employed to collect data without manipulating variables. The sample size was determined using Slovin's formula, resulting in 219 students. The study employed a fishbowl method for random sampling. The study found a balanced distribution of male and female participants. The students demonstrated a satisfactory level of scientific literacy and critical thinking ability. The proposed action plan aims to enhance these skills through training sessions, targeted modules, project-based learning, and an assessment system. The plan focuses on improving students' ability to articulate concepts, evaluate information, understand ethical considerations, and develop teamwork skills. The expected outcomes include measurable progress and increased student engagement in scientific reasoning and problem-solving. It also presents a proposed action plan to improve these skills, which includes training sessions, targeted modules, project-based learning, and an assessment system. The study recommends curriculum developers, educators, students, and future researchers in the field of science education to put importance of critical thinking skills, effective communication, diverse teaching strategies, and active student participation in scientific education. Furthermore, it suggests conducting longitudinal studies to track students' development over time and identify effective strategies for promoting scientific literacy and lifelong learning.

I. Introduction

Science Education is the teaching and learning of science that nurtures the curiosity of people to develop their scientific literacy and seek meaning and understanding of the world around them. Today’s scientific literacy and critical thinking are more than just an additional skill for academic purposes in the twenty-first century. It is rather the fundamental competence that helps people cope with the modern rapidly evolving reality and survive in it. Secondary school science education is particularly important because it endows young people with these skills which help them understand and appreciate how science affects their lives.

Scientific literacy is a way of perceiving science in terms of what it is and how it works. This leads to an understanding of scientific information, the ability to participate in scientific conversations, and decision-making backed by data. On the other hand, critical thinking means analyzing data critically, evaluating arguments, and detecting fallacies or errors in reasoning.

A *Comparative Study of the United States and Kenya on Perspectives on Science Literacy* (2015), implies that issues in science literacy development are a worldwide phenomenon. The most prevalent problems that were identified by educators in both the US and Kenya were: attitude to science and lack of interest by students. However, Kenyan educators also identified a lack of proficiency in the English language, a lack of good science foundation, and a lack of resources and materials, as major problems. This may be understandable because of the status of English as a second language.

According to Martinez-Hernandez (2015), building students' interest in science must start as early as possible. It is important to pay attention to science literacy at the elementary school level, where students acquire the foundational skills needed to navigate the learning of science. Efforts should be made to entice students at this level to inculcate a love of science by introducing them to science concepts through read-aloud of science texts, hands-on activities, group collaboration that supports the discourse of science, field trips, and student-friendly pedagogies.

Science literacy is knowledge of science, as well as the scientific framework by which people make decisions based on facts, research, and knowledge (Lodl, 2023). Similarly, Asbrook (2020) explained that scientific literacy is having an understanding of what science is and how to use scientific information in daily decision-making.

In the book, *The New Science Literacy: Using Language Skills to Help Students Learn Science,* it was explained that in an age fueled by information and driven by technology, understanding the concepts and process of science is as indispensable as knowing how to read, write, speak, and listen

Through critical thinking, learners can understand the importance of evaluating facts, gathering and analyzing diverse types of data, and drawing conclusions based on evidence. Lastly, learners can better understand some basic scientific principles such as cause and effect relationships, experimentation, and knowledge implementation (Harlen, 2010; Vieira & Tenreiro-Vieira, 2016).

Critical thinking is useful in science teaching. However, teachers need to implement appropriate activities that will help learners develop their skills and ability to think critically. To identify what these activities should be, it is important to clarify certain points around this skill. Initially, it is necessary to be precise about what role it has in science teaching. Then it is possible to know what activities can be used in science teaching and qualify learners with those components so that they become critical thinkers, as required (Santos, 2017; Santos Menesses, 2020).

Literature Review

Science for All Americans defined scientific literacy and critical thinking as essential components of a well-rounded science education. These foundational skills equip students with the ability to understand key concepts, develop scientific reasoning, and utilize scientific knowledge for personal and social purposes.

In the Philippines, Science Education has a great problem in addressing the issue of scientific literacy. In 2018 and 2022, the country got a poor ranking in the Programme for International Student Assessment (PISA). PISA is a student assessment of 15-year-old learners across 79 countries done by the Organization for Economic Cooperation and Development (OECD) as part of the Quality Basic Education reform plan and a step towards globalizing the quality of Philippine basic education. This evaluates the system of education worldwide as it tests the skills and knowledge of learners in mathematics, reading, and science.

The Philippines' low performance in science and scientific literacy poses a serious challenge to teachers, as they are the prime movers of education. It can be viewed that teachers possess both the privilege and responsibility of helping to address some issues in our educational system. (Palines and Ortega-Dela Cruz, 2021).

This study would have great importance for the Tibag High School community and the rest of the schools in Tarlac City, especially for the passionate and dedicated teachers who are trying to improve the education process of students. The results would be useful in guiding teachers on how to improve learning strategies designed to enhance students' development in science literacy, critical thinking, and cognition.

II. Methodology

Research Design and Strategy

In gathering pertinent data to determine the scientific literacy and critical thinking of Grade 9 Junior High School Students of Tibag High School, this study used a stratified random sampling design that allows a systematic selection of the population which ensures a representative sample and minimizes bias. According to Hayes (2023), stratified random sampling is a method of sampling that involves the division of a population into smaller subgroups known as strata. In stratified random sampling or stratification, the strata are formed based on members' shared attributes or characteristics.

Population and Locale of the Study

The study focuses on Tibag High School which is classified as a mega school with a diverse population of 484 Grade 9 students. Tibag High School's size and diverse student body encompassing students from different areas with a range of academic performance and gender

identities allows it to offer a representative of the broader Grade 9 population within the city of Tarlac.

There are a total of 11 sections in Grade 9 and to determine the sample size of the study, Slovin's formula was used. Slovin's formula is used to calculate the minimum sample size needed to estimate a statistic based on an acceptable margin of error.

Slovin's formula is calculated as:

$$\mathbf{n = N / (1 + Ne^2)}$$

where:

n: Sample size needed

N: Population size

E: Acceptable margin of error

To calculate the sample size for a 5% margin of error (e=0.05)

$$n = N / (1 + Ne^2)$$

$$n = 484 / (1 + 484 (0.05)^2)$$

$$n = 219$$

Therefore, based on Slovin's formula with a 5% margin of error, a sample size of approximately 219 students was selected.

Grade 9 – Section	Frequency	Number of Students to Be Assessed
Aristotle	45	20
Curie	41	19
Dalton	43	20
Einstein	43	19
Franklin	45	20
Galilei	45	20
Maxwell	48	22
Mendel	47	21
Newton	39	19
Perkin	43	19
Wald	45	20
TOTAL	484	219

Table 1. Population of the Study

Data Gathering Tools

In gathering comprehensive data on the Scientific Literacy and Critical Thinking Ability of Grade 9 Junior High School Students, two instruments were utilized.

The utilization of a 5-point Likert scale in this study offers a structured and efficient method for assessing the scientific literacy and critical thinking abilities of Grade 9 Junior High School students at Tibag High School. This scale provides a range of response options, allowing teachers to rate students' proficiency levels across various dimensions of scientific literacy and critical thinking with granularity. The use of a Likert scale facilitates standardized evaluation, enabling teachers to provide nuanced assessments while maintaining consistency in their ratings. Additionally, the simplicity of the scale enhances ease of administration and interpretation, making it accessible for both teachers and researchers. Overall, the 5-point Likert scale serves as a valuable tool for capturing and quantifying the diverse skill sets of students in scientific literacy and critical thinking, thereby facilitating informed decision-making and targeted interventions to support their academic development.

The legend of the Likert scale is shown below:

Verbal Description	Index	Range
Strongly Agree	5	4.21 - 5.00
Agree	4	3.41 – 4.20
Slightly Agree	3	2.61 – 3.40
Disagree	2	1.81 – 2.60
Strongly Disagree	1	1.00 – 1.80

Data Gathering Procedure

The instrument to be utilized in the research is a questionnaire to gather data regarding the scientific literacy and critical thinking ability of the students. The researcher sought permission to conduct the study to the Schools District Superintendent of Tarlac City Schools Division including the school head of the school where the study was conducted through a letter of consent.

Treatment of Data

The use of weighted mean in this study provides a comprehensive understanding of the scientific literacy and critical thinking abilities of Grade 9 Junior High School students at Tibag High School. By assigning weights to each aspect of scientific literacy and critical thinking, as

rated by teachers, the study captures the relative importance of different skills and competencies within these domains.

Weighted Mean Formula:

$$W = \frac{\sum_{i=1}^{n} w_i X_i}{\sum_{i=1}^{n} w_i}$$

Whereas:

W = weighted average

n = number of terms to be averaged

w_{i} = weights applied to x values

X_{i} = data values to be averaged

III. Results and Discussion

Table 1
Level of Scientific Literacy of Grade 9 Junior High School Students from Tibag National High School Rated by the Teachers in terms of Explaining Phenomenon Scientifically

Explaining Phenomenon Scientifically	Mean	Interpretation
Student can use visual aids or models when explaining scientific phenomena	4.32	Strongly Agree
Student can integrate interdisciplinary knowledge when explaining scientific phenomena, demonstrating connections between different scientific fields	4.24	Strongly Agree
Student can articulate complex scientific phenomena and demonstrate an understanding of fundamental principles and concepts	3.67	Agree
Student can use accurate and concise language to describe scientific phenomena, avoiding jargon and ensuring clarity for a diverse audience	3.51	Agree
Student can communicate scientific phenomena in a manner that considers the diverse perspectives and prior knowledge	3.42	Agree
Student can incorporate evidence and relevant research findings into their explanations of scientific phenomena	3.41	Agree

Student can anticipate and address potential misconceptions or uncertainties that may arise when explaining scientific phenomena to others	3.41	Agree
Student can use analogies or real-world examples to simplify complex scientific phenomena, ensuring accessibility without sacrificing accuracy	3.37	Slightly Agree
Student can engage in dynamic discussions about scientific phenomena, demonstrating flexibility in adapting explanations based on audience questions and feedback	3.33	Slightly Agree
Student can effectively communicate the implications and significance of scientific phenomena, considering broader societal, ethical, or environmental implications	3.00	Slightly Agree
General Weighted Mean	3.52	Agree

Table 1 presents the level of scientific literacy among Grade 9 Junior High School students from Tibag National High School, as rated by their teachers, particularly in terms of explaining scientific phenomena. Each criterion is rated on a scale, providing insight into the students' proficiency in various aspects of scientific explanation.

1.2 Designing and Evaluating Scientific Investigations

Table 2 provides an evaluation of the level of scientific literacy among Grade 9 junior high school students, as assessed by their teachers, with a specific focus on their proficiency in designing and evaluating scientific investigations. The ability to design and evaluate scientific investigations is a crucial component of scientific literacy, as it equips students with the skills necessary to formulate hypotheses, plan experiments, collect and analyze data, and draw meaningful conclusions.

Table 2
Level of Scientific Literacy of Grade 9 Junior High School Students from Tibag National High School Rated by the Teachers in terms of Designing and Evaluating Scientific Investigations

Designing and Evaluating Scientific Investigations	Mean	Interpretation
Student can understand and explain the steps of a scientific experiment, including how to set it up and analyze the results	4.52	Strongly Agree
Student can create clear and focused scientific questions, hypotheses, and objectives for a research project	4.49	Strongly Agree
Student can confidently choose appropriate ways to collect and analyze data in a science experiment	4.32	Strongly Agree
Student can interpret data and identify patterns or trends in scientific experiments	4.18	Agree
Student can consider ethical aspects when planning and conducting scientific experiments	3.78	Agree
Student can read and understand scientific articles, identifying gaps in knowledge and suggesting future research ideas	3.77	Agree
Student can present scientific findings, including methods, results, and conclusions, in a way that others can easily understand	3.72	Agree
Student can design experiments, including selecting variables and controls	3.71	Agree
Student can understand the differences between types of research designs (like experiments or surveys) and when to use each	3.33	Slightly Agree
Student can work well with others in planning and carrying out scientific experiments, showing good teamwork and communication skills.	2.50	Slightly Agree
General Weighted Mean	3.83	Agree

Table 2 provides an assessment of Grade 9 Junior High School students' scientific literacy from Tibag National High School, focusing on their ability to design and evaluate scientific investigations. The ratings, as provided by teachers, shed light on various competencies crucial for conducting scientific research.

Students demonstrate a strong understanding of fundamental aspects of experimental design, as evidenced by high mean scores in understanding and explaining the steps of a scientific

experiment (4.52) and creating clear and focused scientific questions, hypotheses, and objectives (4.49). These scores suggest that students possess the necessary knowledge and skills to formulate research inquiries and design experiments effectively.

1.3 Interpreting Data and Facts Scientifically

Table 3 presents an assessment of the level of scientific literacy among Grade 9 junior high school students, as evaluated by their teachers, specifically focusing on their ability to interpret data and facts scientifically. In the realm of scientific inquiry, the skill to interpret data and facts is essential for students to draw meaningful conclusions and make evidence-based claims.

Table 3
Level of Scientific Literacy of Grade 9 Junior High School Students from Tibag National High School Rated by the Teachers in terms of Interpreting Data and Facts Scientifically

Interpreting Data and Facts Scientifically	Mean	Interpretation
Student can accurately interpret and analyze graphical representations of scientific data, such as charts or graphs	4.67	Strongly Agree
Student can to identify patterns, trends, or relationships within sets of scientific data	4.60	Strongly Agree
Student can distinguish correlation and causation when interpreting scientific evidence	4.55	Strongly Agree
Student can effectively draw conclusions from experimental results and support those conclusions with evidence	4.17	Agree
Student can critically evaluate the reliability of scientific evidence	3.67	Agree
Student can generalize and make predictions based on given scientific data	3.67	Agree
Student can recognize outliers or anomalies in scientific data and considering their impact on overall conclusions	3.41	Agree
Student can interpret data from multiple sources and integrate information to form a comprehensive understanding of a scientific phenomenon	3.33	Slightly Agree
Student can synthesize textual and visual scientific information to draw informed conclusions	2.97	Slightly Agree
Student can communicate and explain their interpretations of scientific data to others, ensuring clarity and understanding	2.77	Slightly Agree
General Weighted Mean	3.78	Agree

The results indicate that students excel in accurately interpreting and analyzing graphical representations of scientific data (mean = 4.67) and identifying patterns, trends, or relationships within data sets (mean = 4.60), both falling under the "Strongly Agree" category. This suggests a high level of competence in visual data analysis and pattern recognition among students. The high mean scores in accurately interpreting and analyzing graphical representations of scientific data align with research emphasizing the benefits of visual data analysis in promoting students' understanding of complex scientific concepts.

2. Level of Critical Thinking Ability of Grade 9 Junior High School Students Rated by the Teachers

The development of critical thinking skills is essential for Grade 9 junior high school students as it enables them to analyze information, evaluate arguments, and make informed decisions. Teachers play a crucial role in assessing and fostering students' critical thinking abilities.

2.1 Analyzing

Table 4 provides an assessment of the level of critical thinking ability among Grade 9 junior high school students, as rated by their teachers, with a specific focus on their analytical skills. Critical thinking is a vital cognitive skill that enables students to analyze information, evaluate arguments, and make reasoned judgments. This table aims to offer valuable insights into the students' proficiency in analyzing complex problems, identifying patterns, and drawing logical inferences.

Table 4 presents an evaluation of Grade 9 Junior High School students' critical thinking ability at Tibag National High School, focusing on their capacity to differentiate between various aspects of scientific analysis. The ratings provided by teachers offer insights into students' proficiency in discerning differences and making informed judgments.

Table 4
Level of Critical Thinking Ability in Analyzing among Grade 9 Junior High School Students from Tibag National High School Rated by the Teachers in Terms of Differentiating

Differentiating	Mean	Interpretation
Student can distinguish between reliable and unreliable sources of information when researching a scientific topic	4.67	Strongly Agree
Student can identify key differences and similarities between competing theories or explanations for a given scientific phenomenon	4.55	Strongly Agree
Student can recognize and analyze conflicting viewpoints within scientific literature related to a specific topic	4.17	Strongly Agree
Student can identify and explain the significance of outliers or anomalies in experimental data	4.09	Agree
Student can discriminate between correlation and causation when analyzing relationships within scientific observations or experimental results	3.67	Agree
General Weighted Mean	4.23	Strongly Agree

The results highlight that students excel in various aspects of differentiating scientific information. They demonstrate a strong ability to distinguish between reliable and unreliable sources of information when researching scientific topics, as indicated by a mean score of 4.67, falling under the "Strongly Agree" category. This suggests that students possess a high level of discernment in evaluating the credibility of sources, a crucial skill in critical thinking.

Table 5
Level of Critical Thinking Ability in Analyzing among Grade 9 Junior High School Students from Tibag National High School Rated by the Teachers in Terms of Organizing

Organizing	Mean	Interpretation
Student can organize and categorize scientific information from various sources to form a coherent understanding of a complex topic	4.33	Strongly Agree
Student can effectively structure and present a well-organized scientific argument, including logical sequencing of evidence and conclusions	4.27	Strongly Agree
Student can in create visual representations, such as concept maps or diagrams, to organize and illustrate complex scientific concepts	4.10	Agree
Student can synthesize information from multiple scientific studies to create a comprehensive and organized overview of a research topic	4.23	Agree
Student can systematically organize and prioritize experimental variables when designing and conducting a scientific investigation	3.36	Slightly Agree
General Weighted Mean	4.05	Agree

Table 5 presents an assessment of Grade 9 Junior High School students' critical thinking ability at Tibag National High School, focusing on their capacity to organize scientific information effectively. The ratings provided by teachers offer insights into students' proficiency in structuring and presenting scientific arguments, as well as organizing data and concepts.

Table 6
Level of Critical Thinking Ability in Analyzing among Grade 9 Junior High School Students from Tibag National High School Rated by the Teachers in Terms of Attributing

Attributing	Mean	Interpretation
Student can attribute cause-and-effect relationships within scientific phenomena, considering multiple variables and potential confounding factors	4.43	Strongly Agree
Student can attribute significance to specific pieces of evidence when constructing a persuasive scientific argument	4.25	Strongly Agree
Student can attribute credibility to scientific information based on the qualifications of the researchers, the publication source, and the research methodology	3.53	Agree
Student can attribute the reliability of experimental results to the appropriateness of the chosen experimental design	3.42	Agree
Student can attribute the broader implications of scientific findings to societal, environmental, or ethical considerations when discussing research outcomes	3.30	Slightly Agree
General Weighted Mean	3.78	Agree

Table 6 presents an assessment of Grade 9 Junior High School students' critical thinking ability at Tibag National High School, focusing on their capacity to attribute significance, credibility, and cause-and-effect relationships within scientific contexts. The ratings provided by teachers offer insights into students' proficiency in discerning and attributing various aspects of scientific analysis.

Table 7
Level of Critical Thinking Ability in Evaluating among Grade 9 Junior High School Students from Tibag National High School Rated by the Teachers in Terms of Checking

Checking	Mean	Interpretation
Student can check for potential bias in scientific studies, including funding sources and conflicts of interest that may influence research outcomes	4.14	Agree
Student can fact-check scientific claims by cross-referencing information from multiple reputable sources to ensure accuracy	4.03	Agree
Student can critically evaluate the validity of experimental procedures, ensuring that they are appropriate for testing a specific scientific hypothesis	3.39	Slightly Agree
Student can students assess the reliability and credibility of scientific information available on the internet, considering factors such as the author's qualifications and the publication source	3.26	Slightly Agree
Student can critically analyze and verify statistical data presented in scientific research, ensuring that the results are accurately represented	3.02	Slightly Agree
General Weighted Mean	3.56	Agree

Table 7 presents an evaluation of Grade 9 Junior High School students' critical thinking ability at Tibag National High School, focusing on their capacity to evaluate scientific information through checking for biases, fact-checking claims, and assessing the validity of experimental procedures. The ratings provided by teachers offer insights into students' proficiency in critically evaluating scientific studies and information.

The results indicate that students demonstrate proficiency in checking for potential bias in scientific studies, including funding sources and conflicts of interest, with a mean score of 4.14, falling under the "Agree" category. This suggests that students are capable of recognizing and evaluating potential sources of bias that may influence research outcomes, reflecting their ability to approach scientific information critically.

analyze potential sources of bias in scientific information. Critical evaluation skills enable students to identify biases related to funding sources, conflicts of interest, or ideological perspectives that may impact the objectivity of scientific findings (Allchin, 2011). By fostering the ability to assess biases, educators can empower students to critically evaluate the reliability and credibility of scientific information.

Table 8
Level of Critical Thinking Ability in Evaluating among Grade 9 Junior High School Students from Tibag National High School Rated by the Teachers in Terms of Critiquing

Critiquing	Mean	Interpretation
Student can critically evaluate the soundness of scientific arguments, pointing out any logical fallacies or inconsistencies in reasoning	4.10	Agree
Student can critique the ethical considerations of a scientific experiment, addressing issues related to participant consent, animal welfare, and overall research integrity	3.63	Agree
Student can critique the appropriateness of the sample size and demographic representation in scientific studies to assess the generalizability of results	3.36	Slightly Agree
Student can critique the experimental design of a scientific study, identifying any limitations or flaws in the methodology	3.21	Slightly Agree
Student can critically evaluate the reliability of scientific evidence	3.03	Slightly Agree
General Weighted Mean	3.47	Agree

Table 8 provides an evaluation of Grade 9 Junior High School students' critical thinking ability at Tibag National High School, focusing on their capacity to critique various aspects of scientific studies and arguments. The ratings provided by teachers offer insights into students' proficiency in identifying logical fallacies, evaluating ethical considerations, and critiquing research methodologies.

2.2 Creating

The following tables provides an assessment of the level of critical thinking ability among Grade 9 junior high school students, as rated by their teachers, with a specific focus on their creative thinking skills. Critical thinking encompasses the ability to generate innovative ideas, think outside the box, and engage in problem-solving. This table aims to offer valuable insights into the students' proficiency in creating novel solutions, exploring alternative perspectives, and demonstrating originality in their thinking.

Table 9
Level of Critical Thinking Ability in Creating among Grade 9 Junior High School Students from Tibag National High School Rated by the Teachers in Terms of Producing

Producing	Mean	Interpretation
Student can produce innovative visual representations, such as infographics or presentations, to communicate complex scientific concepts	4.33	Strongly Agree
Student can generate and design creative solutions to scientific problems, demonstrating an ability to think beyond conventional approaches	4.05	Agree
Student can produce and execute plans for designing and conducting their scientific experiments, considering variables and controls	3.67	Agree
Student can produce clear and well-structured scientific reports, including effective communication of experimental procedures, results, and conclusions	3.33	Slightly Agree
Student can produce hypotheses and predictions that go beyond textbook examples, showcasing original thinking in formulating scientific inquiries	3.27	Slightly Agree
General Weighted Mean	3.73	Agree

Table 9 assesses the critical thinking ability of Grade 9 Junior High School students at Tibag National High School in terms of their capacity to produce various components of scientific work. The ratings provided by teachers offer insights into students' proficiency in generating innovative solutions, designing experiments, and communicating scientific concepts effectively.

Table 10
Level of Critical Thinking Ability in Creating among Grade 9 Junior High School Students from Tibag National High School Rated by the Teachers in Terms of Innovating

Innovating	Mean	Interpretation
Student can innovate new ways to visualize and represent data, enhancing the clarity and impact of their scientific presentations	3.53	Agree
Student can innovate and adapt experimental procedures to address unexpected challenges or limitations encountered during scientific investigations	3.33	Slightly Agree
Student can innovate in the design of scientific experiments, introducing novel variables or approaches to test hypotheses more effectively	3.27	Slightly Agree
Student can innovate environmentally sustainable practices when conducting scientific experiments or research	2.89	Slightly Agree
Student can innovate and propose novel applications or extensions of existing scientific theories, demonstrating creativity in connecting diverse scientific concepts.	2.78	Slightly Agree
General Weighted Mean	3.16	Slightly Agree

Table 10 evaluates the critical thinking ability of Grade 9 Junior High School students at Tibag National High School in terms of their capacity to innovate within scientific contexts. The ratings provided by teachers offer insights into students' proficiency in developing new ways to visualize data, adapting experimental procedures, and proposing novel applications of scientific theories.

IV. Conclusion

The students demonstrate a level of scientific literacy in terms of Explaining Phenomenon Scientifically, as reflected in the general weighted mean of 3.52, falling under the "Agree" category. While they excel in certain aspects, such as using visual aids and integrating interdisciplinary knowledge, there are areas, such as articulating complex concepts and utilizing analogies effectively, where further development is needed. The students exhibit a level of scientific literacy in designing and evaluating scientific investigations, as indicated by the general weighted mean of 3.83, falling under the "Agree" category. While they excel in many aspects, there are opportunities for growth, particularly in understanding ethical considerations, experimental design, and teamwork skills. The students demonstrate a level of scientific literacy

in interpreting data and facts scientifically, as indicated by the general weighted mean of 3.78, falling under the "Agree" category.

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