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Phenomenon-Based Learning Approach on the Students' Competencies and Critical Thinking Skills in Science 10

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***Abstract*—*This study investigates the effectiveness of the Phenomenon-Based Learning Approach in teaching Science 10 and its effect on students' competencies and critical thinking skills. Specifically, it looks at the extent of its utilization Phenomenon Based Learning Approach to the level of students' competencies and critical thinking skills as well as its relationship with their competencies and its effects to critical thinking skills. A descriptive-experimental research design was employed involving seventy (70) Grade 10 students at Linga National High School selected by means of purposive sampling. Data was gathered using written tests, performance tasks, and survey questionnaires. Statistical instruments like frequency, percentage, mean, and standard deviation were used to analyze and interpret the gathered data. Findings reveal that the Phenomenon-Based Learning Approach was found to be highly effective across all dimensions, particularly in enhancing students' observation and questioning, interdisciplinary investigation, research and problem solving and application also in understanding of scientific concepts, application of understanding of real-world circumstances, and development of problem-solving and inquiry skills. Students demonstrated very satisfactory levels in terms of analyzing and evaluating, but only fair performance in creating. Moreover, a significant relationship was found between the use of the approach and students' competencies in Science. However, no significant effect was established between the approach and students' Critical thinking abilities. The research concludes that the Phenomenon-Based Learning Approach is a useful tactic for enhancing scientific competencies but may require complementary instructional techniques to further strengthen higher-order cognitive abilities. Based on the findings, the hypothesis stating that there is no significant relationship/effect is rejected, indicating that the Phenomenon-Based Learning Approach has a significant influence on students' competencies and critical thinking skills. This implies that teachers may strengthen instructional practices by integrating additional strategies alongside Phenomenon-Based Learning to further develop students' higher-order thinking skills and ensure more holistic science learning outcomes. It is advised that teachers incorporate additional tactics targeting thinking critically alongside phenomenon-based instruction. Teachers may incorporate additional strategies specifically designed to cultivate higher-order cognitive abilities, like explicit critical thinking exercises, guided inquiry, reflective questioning, and problem-based tasks, to complement the Phenomenon-Based Learning Approach.*

***Keywords*—*Phenomenon-based, critical thinking, competencies, approach, high order thinking.*

I. INTRODUCTION

The quality of science education has become a serious concern in preparing students for the requirements of the 21st century. As educational systems worldwide deal with the challenge of developing scientifically literate populations capable of critical thinking and problem-solving, traditional approaches to science instruction are being questioned and reimagined. The demand for creative teaching methods that enhance critical thinking, and in-depth understanding has never been more forcing.

Science 10 represents a pivotal stage in students' scientific journey, where fundamental concepts across multiple fields physics, chemistry, biology, and earth science are integrated to build comprehensive scientific understanding. However, conventional teaching methods often neglect to develop the critical thinking competencies essential for scientific literacy and lifelong learning. Students frequently struggle to relate academic understanding to practical applications, which restricts their capacity to engage deeply with scientific phenomena and make knowledgeable choices regarding scientific problems that impact their lives. (Montebon, Daryl Roy (2021) PNU)

The phenomenon-based learning approach emerges as a promising solution to these challenges. By securing instruction in observable, real-world phenomena, this educational structure naturally engages students in realistic scientific inquiry while developing critical thinking skills through investigation, analysis, and evidence-based reasoning. Unlike traditional content driven instruction, phenomenon-based learning positions students as engaged researchers who build knowledge through exploration of compelling scientific phenomena.

This study investigates the utilization of phenomenon-based approaches for developing critical thinking skills and competencies among Science 10 students. By methodical evaluation of this creative teaching approach, the research aims to provide practical evidence of its effectiveness in enhancing student learning outcomes and inform evidence-based practices in science education.

The significance of this investigation extends beyond academic achievement to involve the wider goal of developing scientifically literate citizens equipped with the critical thinking capabilities necessary for directing an increasingly complex and technology-driven world. As educators seek effective strategies for preparing students to meet modern challenges, this research contributes valuable insights into the capacity for transformation of phenomenon-based learning in the teaching of science.

1.1 Statement of the Problem

Problem/s which were addressed by the research

This study sought to determine how effective the Phenomenon-Based Approach was in teaching Science 10, as well as its effects on students' critical thinking skills and Science competencies.

Specifically, it aimed to respond the following questions:

1. What is the extent of utilizing Phenomenon-Based Learning Approach in terms of:
   1. 1 Observation and questioning;
   1. 2 Interdisciplinary investigation;
   1. 3 Research and problem-solving; and
   1.4 Application?
2. What is the level of competencies of the students in Science in terms of:
   2.1 Understanding scientific concepts;
   2.2 Applying knowledge to real-life situations; and
   2.3 Problem-solving and inquiry skills?
3. What is the level of critical thinking skills of the students in Science in terms of:
   3.1 Analyzing;
   3.2 Evaluating; and
   3.3 Creating?
4. Is there a significant relationship between the extent of using Phenomenon-Based Learning Approach and competencies of students in Science?
5. Is there a significant effect between the extent of using Phenomenon-Based Learning Approach and critical thinking skills of students in Science?

II. METHODOLOGY

A descriptive-experimental research design was employed involving seventy (70) Grade 10 students at Linga National High School selected by means of purposive sampling. Data was gathered using written tests, performance tasks, and survey questionnaires. Statistical instruments like frequency, percentage, mean, and standard deviation were used to analyze and interpret the gathered data.

III. RESULTS AND DISCUSSION

The data collected for this investigation is presented, analyzed, and interpreted in this chapter. This chapter provided answers to all the individual problems in Chapter 1 under the problem statement, backed up with tables. It displays the information acquired regarding the Phenomenon-Based Approach's efficacy in teaching Science 10 and its effects on students' critical thinking abilities and the growth of science competence. The study specifically aimed at addressing the following:

Extent of Using Phenomenon-Based Learning Approach

In this study, the extent of Phenomenon-Based Learning Approach refers to Observation and Questioning; Interdisciplinary Investigation; Research and Problem-Solving; and Application.

The extent of Phenomenon-Based Learning Approach is revealed in the following table, which shows the statement, mean, standard deviation, remarks, and verbal interpretation.

Table 1 shows the extent of Phenomenon-Based Learning Approach to Observation and Questioning. The results show that the respondents obtained a (WM = 4.65, SD = 0.48), interpreted as Very High Extent. This indicates that learners perceive that the Phenomenon-Based Learning Approach is consistently applied in developing their observation and questioning skills in Science.

Table 1. Extent of Phenomenon-Based Learning Approach in terms of Observation and Questioning

Statement As a learner in Science, the Phenomenon-Based Approach allows me to…	Mean	SD	Remarks
...observe before starting a lesson.	4.70	0.46	Strongly Agree
...describe what I observe during science activities.	4.64	0.48	Strongly Agree
...be motivated to ask questions about scientific phenomena.	4.61	0.52	Strongly Agree
...explore my own questions during class.	4.54	0.50	Strongly Agree
...connect my observations to science concepts discussed in class.	4.73	0.45	Strongly Agree
Weighted Mean	4.65		
SD	0.48		
Verbal Interpretation	Very High Extent		

Among the statements, “connect my observations to science concepts discussed in class” obtained the highest M = 4.73 (SD = 0.45) with the remark Strongly Agree. This suggests that learners are highly capable of linking their observations to the scientific concepts being taught. The statement “observe before starting a lesson” obtained a mean of 4.70 (SD = 0.46), interpreted as Strongly Agree. This indicates that learners are consistently encouraged to observe first before engaging in the lesson.

Meanwhile, the statement “describe what I observe during science activities” obtained (M = 4.64, SD = 0.48), also understood as Strongly Agree, suggesting that learners can clearly express their observations during activities. The statement “be motivated to ask questions about scientific phenomena” obtained (M = 4.61, SD = 0.52), interpreted as Strongly Agree, indicating that the approach effectively encourages curiosity and inquiry among learners. The lowest mean was obtained by the statement “explore my own questions during class” with M = 4.54 (SD = 0.50). Although still understood as Strongly Agree, this suggests that allowing learners to fully explore their own questions may have slightly less emphasis compared to other indicators.

Overall, the results demonstrate that the Phenomenon-Based Learning Approach is incredibly efficient in enhancing learners’ ability to observe and ask meaningful questions during Science instruction. It also shows that students become more connected and curious as they enthusiastically participate in the process of learning. Furthermore, the strategy encourages the creation of deeper understanding by encouraging learners to connect observations with scientific reasoning. Additionally, the approach promotes active inquiry

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and critical thinking skills, enabling learners to become more engaged and independent in exploring scientific concepts and real-world phenomena.

Table 2 shows the extent of Phenomenon-Based Learning Approach in terms of Interdisciplinary Investigation.

Table 2. Extent of Phenomenon-Based Learning Approach in terms of Interdisciplinary Investigation

Statement As a learner in Science, the Phenomenon-Based Approach provides…	Mean	SD	Remarks
…interrelation of ideas from other subjects (e.g., math, health, or social studies).	4.66	0.48	Strongly Agree
…connection between science and real-world issues.	4.64	0.48	Strongly Agree
…knowledge from different subjects when solving problems.	4.63	0.49	Strongly Agree
…understanding on how science relates to daily life.	4.79	0.41	Strongly Agree
…explanation of science topic using ideas from other disciplines.	4.71	0.46	Strongly Agree
Weighted Mean	4.69		
SD	0.46		
Verbal Interpretation	Very High Extent		

The results show that the respondents obtained a (WM = 4.69, SD = 0.46), interpreted as Very High Extent. This indicates that learners perceive that the Phenomenon-Based Learning Approach is consistently applied in integrating knowledge from different disciplines in Science learning. Among the statements, “understanding on how science relates to daily life” obtained the highest M = 4.79 (SD = 0.41) with the remark Strongly Agree. This suggests that learners have a strong understanding of how science concepts are connected to their everyday experiences. The statement “explanation of science topic using ideas from other disciplines” obtained a mean of 4.71 (SD = 0.46), interpreted as Strongly Agree. This indicates that learners are able to explain scientific concepts using knowledge from various subject areas.

Meanwhile, the statement “interrelation of ideas from other subjects (e.g., math, health, or social studies)” obtained (M = 4.66, SD = 0.48), also interpreted as Strongly Agree, suggesting that learners recognize the integration of ideas across disciplines. The statement “connection between science and real-world issues” obtained (M = 4.64, SD = 0.48), interpreted as Strongly Agree, indicating that learners see the relevance of science in addressing real-world concerns.

The lowest mean was obtained by the statement “knowledge from different subjects when solving problems” with M = 4.63 (SD = 0.49). Although still interpreted as Strongly Agree, this suggests that applying interdisciplinary knowledge in problem-solving may have slightly less emphasis compared to other indicators.

In summary, the results demonstrate that the Phenomenon-Based Learning Approach is highly effective in promoting interdisciplinary understanding and helping learners connect science with other fields of knowledge.

Table 3 shows the extent of Phenomenon-Based Learning Approach in terms of; Research and Problem-Solving.

The results show that the respondents obtained a (WM = 4.94, SD = 0.23), interpreted as Very High Extent. This indicates that learners perceive that the Phenomenon-Based Learning Approach is consistently applied in enhancing their research and problem-solving skills in Science.

Table 3. Extent of Phenomenon-Based Learning Approach in terms of Research and Problem-Solving

Statement As a learner in Science the Phenomenon-Based Approach helps me to…	Mean	SD	Remarks
…investigate problems scientifically.	4.64	0.48	Strongly Agree
…gather relevant information to solve a science problem.	4.73	0.45	Strongly Agree
…evidence to support my explanations.	4.86	0.35	Strongly Agree
…propose solutions to science-related problems.	4.61	0.49	Strongly Agree
…conduct simple science investigations.	4.61	0.49	Strongly Agree
Weighted Mean	4.94		
SD	0.23		
Verbal Interpretation	Very High Extent		

Among the statements, “evidence to support my explanations” obtained the highest M = 4.86 (SD = 0.35) with the remark Strongly Agree. This suggests that learners are highly effective in using evidence to justify their scientific explanations.

The statement “gather relevant information to solve a science problem” obtained a mean of 4.73 (SD = 0.45), interpreted as Strongly Agree. This indicates that learners are able to collect and utilize appropriate information when solving scientific problems. Meanwhile, the statement “investigate problems scientifically” obtained (M = 4.64, SD = 0.48), also interpreted as Strongly Agree, suggesting that learners are capable of applying scientific methods in investigating problems. The statements “propose solutions to science-related problems” and “conduct simple science investigations” both obtained the lowest mean of M = 4.61 (SD = 0.49). Although still interpreted as Strongly Agree, this suggests that proposing solutions and conducting investigations may have slightly less emphasis compared to other indicators.

Overall, the results demonstrate that the Phenomenon-Based Learning Approach is highly effective in developing learners’ research skills and ability to solve science-related problems.

Table 4 shows the extent of the Utilization of Phenomenon-Based Learning Approach in terms of Application.

The results show that the respondents obtained a (WM = 4.71, SD = 0.45), interpreted as Very High. This indicates that learners perceive that the Phenomenon-Based Learning Approach is consistently applied in enhancing their ability to apply scientific knowledge in real-life contexts.

Among the statements, “application of what I learned in Science to real-life situations” obtained the highest M = 4.84 (SD = 0.37) with the remark Strongly Agree. This suggests that learners are highly effective in applying their scientific knowledge to everyday situations. The statement “find science lessons practical that is useful in my daily life” obtained a mean of 4.81 (SD = 0.39), interpreted as Strongly Agree. This indicates that learners recognize the relevance and usefulness of science in their daily lives.

Table 4. Level of the Utilization Phenomenon-Based Learning Approach in terms of Application.

Statement As a learner in Science, the Phenomenon-Based Approach makes me demonstrate the…	Mean	SD	Remarks
…application of what I learned in Science to real-life situations.	4.84	0.37	Strongly Agree
…practical uses of Science in classroom activities.	4.71	0.46	Strongly Agree
…use scientific ideas to explain everyday events.	4.57	0.50	Strongly Agree
…transfer of my learning to new situations or problems.	4.61	0.49	Strongly Agree
…find science lessons practically that is useful in my daily life.	4.81	0.39	Strongly Agree
Weighted Mean	4.71		
SD	0.45		
Verbal Interpretation	Very High		

Meanwhile, the statement "practical uses of Science in classroom activities" obtained (M = 4.71, SD = 0.46), also interpreted as Strongly Agree, suggesting that learners are able to engage in meaningful and practical science activities within the classroom. The statement "transfer of my learning to new situations or problems" obtained a mean of M = 4.61 (SD = 0.49), interpreted as Strongly Agree, indicating that learners can extend their understanding to new contexts. The statement "use scientific ideas to explain everyday events" obtained the lowest mean of M = 4.57 (SD = 0.50). Although still interpreted as Strongly Agree, this suggests that explaining everyday phenomena using scientific concepts may have slightly less emphasis compared to other indicators.

Overall, the results demonstrate that the Phenomenon-Based Learning Approach is highly effective in developing learners' ability to apply scientific knowledge in practical, real-life, and problem-solving situations. It encourages students to use critical thought and connect scientific concepts to everyday experiences and actual community issues. Moreover, the approach enhances learners' engagement, collaboration, and inquiry skills, which contribute to deeper understanding and meaningful learning in Science. Through active participation and exploration, students become more confident in analyzing problems and making evidence-based decisions.

Level of Students' Competencies in Science

In this study, the level of Students' Competencies in Science refers to Understanding Scientific Concepts; Applying Knowledge to Real-Life Situations; and Problem-Solving and Inquiry Skills. These indicators were used to assess how well students comprehend scientific ideas and apply them in various learning contexts. They also serve as a basis for determining the extent of students' development in higher-order thinking skills in Science. Moreover, these competencies provide valuable insights into students' readiness to engage in scientific investigations and make evidence-based decisions. The assessment of these indicators helps educators identify areas of strength and opportunities for improvement in learners' scientific literacy and overall academic performance.

The level of Students' Competencies in Science is revealed in the following table, which shows the statement, mean, standard deviation, remarks, and verbal interpretation.

Table 5 shows the level of Students' Competencies in Science in terms of Understanding Scientific Concepts.

Table 5. Level of Students' Competencies in Science in terms of Understanding Scientific Concepts

Statement Through the implementation of the Phenomenon-Based Approach, as a student I can…	Mean	SD	Remarks
…easily deliver the main ideas presented in science lessons.	4.69	0.47	Strongly Agree
…explain scientific concepts in my own words.	4.51	0.50	Strongly Agree
…relate new lessons to previous topics.	4.77	0.42	Strongly Agree
…identify key ideas in a science discussion.	4.70	0.46	Strongly Agree
…summarize science concepts accurately.	4.69	0.47	Strongly Agree
Weighted Mean	4.67		
SD	0.47		
Verbal Interpretation	Very High		

The results show that the respondents obtained a (WM = 4.67, SD = 0.47), interpreted as Very High. This indicates that learners perceive that the Phenomenon-Based Learning Approach effectively enhances their understanding of scientific concepts.

Among the statements, "relate new lessons to previous topics" obtained the highest M = 4.77 (SD = 0.42) with the remark Strongly Agree. This suggests that learners are highly capable of connecting new knowledge with prior learning, which supports deeper understanding of scientific concepts. The statement "identify key ideas in a science discussion" obtained a mean of 4.70 (SD = 0.46), interpreted as Strongly Agree. This indicates that learners can recognize important concepts during science discussions.

Meanwhile, the statements "easily deliver the main ideas presented in science lessons" and "summarize science concepts accurately" both obtained a mean of M = 4.69 (SD = 0.47), interpreted as Strongly Agree. This suggests that learners can effectively communicate and condense scientific information. The statement "explain scientific concepts in my own words" obtained the lowest mean of M = 4.51 (SD = 0.50). Although still interpreted as Strongly Agree, this suggests that expressing scientific concepts independently may have slightly less emphasis compared to other indicators.
The findings show that the Phenomenon-Based Learning Approach is very successful at improving students' comprehension of scientific ideas, especially when it comes to making connections between concepts, recognizing important details, and sharing scientific knowledge. These results also imply that students' engagement and higher-order thinking abilities can be greatly enhanced by incorporating this method into science education. Additionally, it fosters the growth of

students' capacity to apply scientific knowledge in practical contexts.

Table 6 shows the level of Students' Competencies in Science in terms of Applying Knowledge to Real-Life Situations;

Table 6. Level of Students' Competencies in Science in terms of Applying Knowledge to Real-Life Situations

Statement Through the implementation of Phenomenon-Based Approach as a student I can…	Mean	SD	Remarks
…use science concepts to explain real-world events.	4.79	0.41	Strongly Agree
…apply classroom learning to everyday problems.	4.67	0.47	Strongly Agree
…see the relevance of science in my community.	4.63	0.49	Strongly Agree
…give examples of how science is used in daily life.	4.73	0.45	Strongly Agree
…connect science lessons to current issues (e.g., climate change, health, disasters).	4.76	0.43	Strongly Agree
Weighted Mean	4.71		
SD	0.45		
Verbal Interpretation	Very High		

The results show that the respondents obtained a (WM = 4.71, SD = 0.45), interpreted as Very High. This indicates that learners perceive that the Phenomenon-Based Learning Approach effectively enhances their ability to apply scientific knowledge in real-life contexts.

Among the statements, "use science concepts to explain real-world events" obtained the highest M = 4.79 (SD = 0.41) with the remark Strongly Agree. This suggests that learners are highly capable of utilizing scientific concepts to interpret real-world phenomena. The statement "connect science lessons to current issues (e.g., climate change, health, disasters)" obtained a mean of 4.76 (SD = 0.43), interpreted as Strongly Agree. This indicates that learners can link scientific knowledge to relevant and contemporary societal issues.

Meanwhile, the statement "give examples of how science is used in daily life" obtained (M = 4.73, SD = 0.45), also interpreted as Strongly Agree, suggesting that learners can demonstrate practical applications of science in everyday situations. The statement "apply classroom learning to everyday problems" obtained a mean of M = 4.67 (SD = 0.47), interpreted as Strongly Agree, indicating that learners can transfer their learning to solve real-life problems.

The statement "see the relevance of science in my community" obtained the lowest mean of M = 4.63 (SD = 0.49). Although still interpreted as Strongly Agree, this suggests that recognizing the broader community relevance of science may have slightly less emphasis compared to other indicators.

Table 7 shows the level of level of Students' Competencies in Science in terms of Problem-Solving and Inquiry Skills.

The results show that the respondents obtained a (WM = 4.66, SD = 0.47), interpreted as Very High. This indicates that learners perceive that the Phenomenon-Based Learning Approach effectively enhances their problem-solving and inquiry skills in Science.

Among the statements, "suggest possible solutions to scientific problems" and "draw conclusions based on evidence" both obtained the highest M = 4.70 (SD = 0.46) with the remark Strongly Agree. This suggests that learners are highly capable of proposing solutions and making evidence-based conclusions in scientific contexts. The statement "identify problems in science-related situations" obtained a mean of 4.67 (SD = 0.47), interpreted as Strongly Agree. This indicates that learners are able to recognize and define problems within scientific situations.

Table 7. Level of Students' Competencies in Science in terms of Problem-Solving and Inquiry Skills.

Statement Through the implementation of the Phenomenon-Based Approach, as a student, I can…	Mean	SD	Remarks
…identify problems in science-related situations.	4.67	0.47	Strongly Agree
…suggest possible solutions to scientific problems.	4.70	0.46	Strongly Agree
…design simple investigations to answer questions.	4.57	0.50	Strongly Agree
…analyze data from experiments.	4.66	0.48	Strongly Agree
…draw conclusions based on evidence.	4.70	0.46	Strongly Agree
Weighted Mean	4.66		
SD	0.47		
Verbal Interpretation	Very High		

Meanwhile, the statement "analyze data from experiments" obtained (M = 4.66, SD = 0.48), also interpreted as Strongly Agree, suggesting that learners can interpret and examine experimental data effectively. The statement "design simple investigations to answer questions" obtained the lowest mean of M = 4.57 (SD = 0.50). Although still interpreted as Strongly Agree, this suggests that designing investigations may have slightly less emphasis compared to other inquiry skills.

The results demonstrate that the Phenomenon-Based Learning Approach is highly effective in developing students' problem-solving and inquiry skills, particularly in generating solutions and drawing conclusions based on evidence.

Level of Students' Critical Thinking Skills in Science

In this study, the level of Students' Critical Thinking Skills in Science refers to Analyzing; Evaluating; and Creating.

The level of Students' Critical Thinking Skills in Science is revealed in the following table, which shows the raw score, frequency, percentage, mean, standard deviation, and verbal interpretation. The data provides a comprehensive overview of the students' performance in various aspects of critical thinking within the context of Science learning. Furthermore, the results serve as a basis for evaluating the effectiveness of instructional strategies in developing higher-order thinking skills among learners.

The data presented in this section provides a clear overview of the students' critical thinking skills in Science in terms of analyzing, evaluating, and creating. These indicators were used to verify the extent to which students demonstrate higher-order cognitive abilities in scientific learning tasks. The table summarizes the distribution of scores along with their

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comparable statistical measures to facilitate a more comprehensive interpretation of the results. Furthermore, the mean and standard deviation values offer insights into the overall performance and variability of the students' critical thinking skills. This allows for a more objective assessment of their cognitive development in Science.

The Table 8 shows the Students' Critical Thinking Skills in Science in terms of Analyzing.

Table 8. Level of Students' Critical Thinking Skills in Science in terms of Analyzing

Raw Score	Frequency (f)	Percentage (%)	Description/Equivalent
13-15	45	64	Outstanding
10-12	13	19	Very Satisfactory
7-9	8	11	Satisfactory
4 -6	4	6	Fair
1-3	0	0	Needs Improvement
	70	100	Very Satisfactory

Mean= 12.41 SD=2.86 VI=VS

It is found that the majority of the respondents fall within the score bracket of 13–15, comprising forty-five (45) students or 64% of the total respondents. This is resulted by those in the 10–12 bracket, with thirteen (13) students or 19%. Meanwhile, eight (8) students or 11% fall under the 7–9 bracket, and four (4) students or 6% belong to the 4–6 bracket. Notably, no respondents fall under the 1–3 bracket, indicating that none of the learners are categorized under Needs Improvement.

It can be collected from Table 8 that the level of students' critical thinking skills in Science in terms of analyzing has a mean score of 12.41, interpreted as Very Satisfactory. The standard deviation of 2.86 implies that the students' performance is relatively heterogeneous, suggesting some variability in their analyzing skills.

Table 9 shows the Students' Critical Thinking Skills in Science refers to Evaluating.

Table 9. Level of Students' Higher-Order Thinking Skills in Science in terms of Evaluating

Raw Score	Frequency (f)	Percentage (%)	Description/Equivalent
13-15	39	56	Outstanding
10-12	21	30	Very Satisfactory
7-9	6	9	Satisfactory
4 -6	4	6	Fair
1-3	0	0	Needs Improvement
	70	100	Very Satisfactory

Mean= 12.20 SD=2.74 VI=VS

It was found that the majority of the respondents fall within the score bracket of 13–15, comprising thirty-nine (39) students or 56% of the total respondents. This is followed by those in the 10–12 bracket, with twenty-one (21) students or 30%. Meanwhile, six (6) students or 9% fall under the 7–9 bracket, and four (4) students or 6% belong to the 4–6 bracket. Notably, no respondents fall under the 1–3 bracket, indicating that none of the learners are categorized under Needs Improvement.

It can be gleaned from Table 9 that the level of students' higher-order thinking skills in Science in terms of Evaluating has a mean score of 12.20, interpreted as Very Satisfactory. The standard deviation of 2.74 indicates that the students' performance is relatively heterogeneous, suggesting some variability in their evaluating skills.

Table 10 shows the Students' Critical Thinking Skills in Science in terms of Creating.

Table 10. Level of the Students' Critical Thinking Skills in Science in terms of Creating.

Raw Score	Frequency (f)	Percentage (%)	Description/Equivalent
13-15	2	3	Outstanding
10-12	12	17	Very Satisfactory
7-9	22	31	Satisfactory
4 -6	21	30	Fair
1-3	13	19	Needs Improvement
	70	100	Fair

Mean= 6.66 SD=2.97 VI=Fair

It is found that the majority of the respondents fall within the score bracket of 7–9, comprising twenty-two (22) students or 31% of the total respondents. This is followed by those in the 4–6 bracket, with twenty-one (21) students or 30%. Meanwhile, thirteen (13) students or 19% fall under the 1–3 bracket, twelve (12) students or 17% belong to the 10–12 bracket, and only two (2) students or 3% are in the 13–15 bracket. It can be gleaned from Table 10 that the level of students' higher-order thinking skills in Science in terms of Creating has a mean score of 6.66, interpreted as Fair. The standard deviation of 2.97 indicates that the students' performance is heterogeneous, suggesting a wide variation in their ability to create and generate new ideas in Science.

Significant Relationship Between the Utilization of Phenomenon-Based Learning Approach and the Students' Students' Competencies in Science

In this study, the level of Utilization of Phenomenon-Based Learning Approach refers to Observation and Questioning; Interdisciplinary Investigation; Research and Problem-Solving; and Application while the and the Students' Students' Competencies in Science refers to Understanding Scientific Concepts; Applying Knowledge to Real-Life Situations; and Problem-Solving and Inquiry Skills. These indicators were utilized to determine the extent to which the Phenomenon-Based Learning Approach was implemented in the teaching and learning process. Likewise, the indicators of students' competencies in Science were used to assess learners' understanding and application of scientific knowledge and skills. The identified variables provided a framework for examining the relationship between instructional practices and student learning outcomes. Through these indicators, the study was able to evaluate how phenomenon-based learning contributes to the development of scientific competencies among students. Furthermore, the findings may serve as a basis for enhancing instructional strategies that promote meaningful and inquiry-based Science learning experiences.

The significant relationship between the utilization of Phenomenon-Based Learning Approach and the students' Competencies in Science is revealed in the following table, which shows the Multiple Regression Analysis using Pearson Product Moment Correlation Coefficient or Pearson-r, p-value, and number of observation or respondents.

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Table 11 shows the significant relationship between the utilization of Phenomenon-Based Learning Approach in terms of Observation and Questioning, Interdisciplinary Investigation, Research and Problem-Solving, and Application to the Students' Competencies in Science in terms of Understanding Scientific Concepts, Applying Knowledge to Real-Life Situations, and Problem-Solving and Inquiry Skills. The analysis aimed to determine whether the utilization of the Phenomenon-Based Learning Approach significantly influences the development of students' competencies in Science across the identified dimensions.

Table 11. Significant Relationship Between the Utilization of Phenomenon-Based Learning Approach and the Students' Competencies in Science

Utilization of Phenomenon-Based Learning Approach		Students' Competencies in Science		
		Understanding Scientific Concepts	Applying Knowledge to Real-Life Situations	Problem-Solving and Inquiry Skills
Observation and Questioning	Pearson Correlation	0.630*	0.407*	0.497*
	Sig. (2-tailed)	0.000	0.000	0.000
	N	70	70	70
Interdisciplinary Investigation	Pearson Correlation	0.584*	0.407*	0.636*
	Sig. (2-tailed)	0.000	0.000	0.000
	N	70	70	70
Research and Problem-Solving	Pearson Correlation	0.753*	0.663*	0.713*
	Sig. (2-tailed)	0.000	0.000	0.000
	N	70	70	70
Application	Pearson Correlation	0.575*	0.496*	0.636*
	Sig. (2-tailed)	0.000	0.000	0.000
	N	70	70	70

The table shows the significant relationship between the utilization of Phenomenon-Based Learning Approach in terms of Observation and Questioning to the Students' Competencies in Science in terms of Understanding Scientific Concepts, Applying Knowledge to Real-Life Situations, and Problem-Solving and Inquiry Skills. It is reflected that the r-values of 0.630, 0.407, and 0.497 respectively are interpreted as there is a "Strong," "Moderate," and "Moderate" relationship respectively. Furthermore, it is confirmed as significant because the p-values of 0.000, 0.000, and 0.000 respectively are lower than the 0.05 level of significance, indicating that the relationships are "Significant."

The table shows the significant relationship between the utilization of Phenomenon-Based Learning Approach in terms of Interdisciplinary Investigation to the Students' Competencies in Science in terms of Understanding Scientific Concepts, Applying Knowledge to Real-Life Situations, and Problem-Solving and Inquiry Skills. It is reflected that the r-values of 0.584, 0.407, and 0.636 respectively are interpreted as there is a "Strong," "Moderate," and "Strong" relationship respectively. Furthermore, it is confirmed as significant because the p-values of 0.000, 0.000, and 0.000 respectively are lower than the 0.05 level of significance, indicating that the relationships are "Significant."

The table shows the significant relationship between the utilization of Phenomenon-Based Learning Approach in terms of Research and Problem-Solving to the Students' Competencies in Science in terms of Understanding Scientific Concepts, Applying Knowledge to Real-Life Situations, and Problem-Solving and Inquiry Skills. It is reflected that the r-values of 0.753, 0.663, and 0.713 respectively are interpreted as there is a "Strong," "Strong," and "Strong" relationship respectively. Furthermore, it is confirmed as significant because the p-values of 0.000, 0.000, and 0.000 respectively are lower than the 0.05 level of significance, indicating that the relationships are "Significant."

The table shows the significant relationship between the utilization of Phenomenon-Based Learning Approach in terms of Application to the Students' Competencies in Science in terms of Understanding Scientific Concepts, Applying Knowledge to Real-Life Situations, and Problem-Solving and Inquiry Skills. It is reflected that the r-values of 0.575, 0.496, and 0.636 respectively are interpreted as there is a "Strong," "Moderate," and "Strong" relationship respectively. Furthermore, it is confirmed as significant because the p-values of 0.000, 0.000, and 0.000 respectively are lower than the 0.05 level of significance, indicating that the relationships are "Significant."

To summarize, the table shows that there is a significant relationship between the utilization of Phenomenon-Based Learning Approach in all its aspects such as Observation and Questioning, Interdisciplinary Investigation, Research and Problem-Solving, and Application, and the Students' Competencies in Science in terms of Understanding Scientific Concepts, Applying Knowledge to Real-Life Situations, and Problem-Solving and Inquiry Skills. This implies that the more effectively students engage with the Phenomenon-Based Learning Approach, the higher their competence in Science.

The development of scientific competencies enhances students' problem-solving and inquiry skills by engaging them in Problem Based Learning (PBL), where they actively participate in constructing their own knowledge. This approach encourages the use of the scientific method formulating hypotheses, conducting experiments, and validating results thereby promoting critical thinking and autonomy. As students navigate problem situations, they become more aware of the learning process, which ultimately fosters their scientific thinking and enhances their ability to tackle complex problems effectively. (Barajas León & Ortiz Alvarado, 2019)

Significant Effect Between the Utilization of Phenomenon-Based Learning Approach on the Students' Critical Thinking Skills in Science

In this study, the level of Utilization of Phenomenon-Based Learning Approach refers to Observation and Questioning; Interdisciplinary Investigation; Research and Problem-Solving; and Application while the Students' Critical

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Thinking Skills in Science refers to Analyzing; Evaluating; and Creating.

The Significant Effect Between the Utilization of Phenomenon-Based Learning Approach on the Students' Critical Thinking Skills in Science is revealed in the following table, which shows the Multiple Regression Analysis using t-Test, with the computed t-value (t-cal), p-value, number of observations or respondents, and critical t-value (t-crit) or constant.

Table 12 shows the significant effect between the utilization of Phenomenon-Based Learning Approach in terms of Observation and Questioning, Interdisciplinary Investigation, Research and Problem-Solving, and Application on the Students' Critical Thinking Skills in Science in terms of Analyzing, Evaluating, and Creating.

Table 12. Significant Effect Between the Utilization of Phenomenon-Based Learning Approach on the Students' Critical Thinking Skills in Science

Utilization of Phenomenon-Based Learning Approach		Students' Critical Thinking Skills in Science		
		Analyzing	Evaluating	Creating
Observation and Questioning	t-value	1.598	1.566	-0.918
	Sig. (2-tailed)	0.115	0.122	0.362
	N	70	70	70
Interdisciplinary Investigation	t-value	0.736	0.130	-1.222
	Sig. (2-tailed)	0.464	0.897	0.226
	N	70	70	70
Research and Problem-Solving	t-value	1.735	0.774	-1.241
	Sig. (2-tailed)	0.087	0.441	0.219
	N	70	70	70
Application	t-value	-0.118	0.434	-0.931
	Sig. (2-tailed)	0.907	0.666	0.355
	N	70	70	70

Constant= 2.00

The table shows the significant effect of Observation and Questioning on the Students' Critical Thinking Skills in Science in terms of Analyzing, Evaluating, and Creating. It is reflected that the r-values are 1.598, 1.566, and -0.918 respectively, interpreted as there is a "Moderate" effect on Analyzing and Evaluating, and a "Negligible" effect on Creating. However, it is also confirmed that these effects are not significant as attested by the p-values of 0.115, 0.122, and 0.362 individually, which are higher than the 0.05 level of significance.

The table shows the significant effect of Interdisciplinary Investigation on the Students' Critical Thinking Skills in Science in terms of Analyzing, Evaluating, and Creating. It is reflected that the r-values are 0.736, 0.130, and -1.222 respectively, interpreted as a "Moderate" effect on Analyzing, and "Negligible" effects on Evaluating and Creating. The effects are not significant as confirmed by the p-values of 0.464, 0.897, and 0.226 respectively, which are higher than 0.05.

It presents the significant effect of Research and Problem-Solving on the Students' Critical Thinking Skills in Science in terms of Analyzing, Evaluating, and Creating. It is reflected that the r-values are 1.735, 0.774, and -1.241 respectively, read as a "Moderate" effect on Analyzing, a "Moderate" effect on Evaluating, and a "Negligible" effect on Creating. The effects are not significant as confirmed by the p-values of 0.087, 0.441, and 0.219 respectively, which are higher than 0.05.

It shows the significant effect of Application on the Students' Critical Thinking Skills in Science in terms of Analyzing, Evaluating, and Creating. It is displayed that the r-values are -0.118, 0.434, and -0.931 respectively, explained as "Negligible" effects for all three domains. The effects are not significant as confirmed by the p-values of 0.907, 0.666, and 0.355 correspondingly, which are higher than the 0.05 level of significance.

To summarize, the table shows that there is no significant effect of the utilization of the Phenomenon-Based Learning Approach in any of its aspects, Observation and Questioning, Interdisciplinary Investigation, Research and Problem-Solving, and Application, on the Students' Critical Thinking Skills in Science in terms of Analyzing, Evaluating, and Creating. This indicates that while the approach may support learning, it does not significantly predict the students' higher-order thinking performance based on this dataset.

The relationship between creative and critical thinking in the context of science instruction emphasized that fostering creative thinking is essential for enhancing critical thinking skills. By integrating creative approaches into critical thinking exercises, students can foster a more comprehensive perception of scientific concepts. This interplay encourages students to analyze, evaluate, and synthesize information critically while also enabling them to produce creative solutions and ideas, contributing to their overall intellectual development. (Wartha & Dos Santos, 2020).

IV. CONCLUSION AND RECOMMENDATIONS

There is a significant relationship between the Utilization of Phenomenon-Based Learning Approach and the Students' Competencies in Science. Thus, the null hypothesis is rejected. This means that the more effectively students engage with the Phenomenon-Based Learning Approach, the higher their competence in Science.

There is no significant effect of the utilization of the Phenomenon-Based Learning Approach across its components on the students' critical thinking skills in Science, indicating that it does not significantly influence their abilities in analyzing, evaluating, and creating. Thus, the null hypothesis is accepted. This implies that while the approach may support learning, it does not significantly predict the students' higher-order thinking performance based on this dataset.

Based on the conclusions, the following recommendations are advised:

Schools and science teachers may continue to integrate the Phenomenon-Based Learning Approach in instruction, as it has been shown to significantly enhance students' competencies in understanding scientific concepts, applying knowledge to real-life situations, and developing problem-solving and inquiry skills.

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Teachers may incorporate additional strategies specifically designed to progress higher-order thinking skills, such as explicit critical thinking exercises, guided inquiry, reflective questioning, and problem-based tasks, to complement the Phenomenon-Based Learning Approach.

Curriculum developers may consider enriching learning materials by embedding activities that target analyzing, evaluating, and creating skills alongside phenomenon-based tasks to better support the growth of students' critical thinking.

Professional development programs for teachers may be strengthened to include training on how to effectively combine critical thinking skill development within the Phenomenon-Based Learning framework.

Future researchers may explore other variables or instructional approaches that could significantly influence students' critical thinking skills, as well as conduct studies with larger samples or different contexts to validate and extend the findings of this study.

Schools may provide a supportive learning environment with adequate resources, such as laboratory equipment, real-world problem scenarios, and collaborative learning opportunities, to maximize the success of phenomenon-based learning and foster deeper scientific engagement.

REFERENCE

[1]. Barajas León, N. A., & Ortiz Alvarado, J. (2019). Desarrollo de competencias científicas en estudiantes de básica primaria mediante la estrategia didáctica de resolución de problemas. Espiral, 8(1), 43–52.

[2]. Montebon, D. R., & Orleans, A. (2021). The Philippine K to 12 Junior Science Program in Thematic Instruction. Recoletos Multidisciplinary Research Journal, 9(1), 107–121.

[3]. Wartha, E. J., & Dos Santos, E. J. S. (2020). Pensamento científico, crítico e criativo: entendendo campos teóricos e perseguindo suas interações. 14(26), 325–346.