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PHILOSOPHICAL AND SOCIOLOGICAL PERSPECTIVES ON TEACHING AND LEARNING IN SCIENCE EDUCATION

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ABSTRACT

This study examined the influence of philosophical and sociological perspectives on the teaching and learning of Science among Senior High School teachers and students at Dinagat School of Fisheries. Anchored on philosophical frameworks such as pragmatism and constructivism, and sociological principles emphasizing social interaction, equity, and cultural responsiveness, the research aimed to determine the extent to which these perspectives are reflected in teaching practices, assess students' learning outcomes, and examine the relationship between the two. A quantitative descriptive–correlational design was employed, involving all Science teachers handling the STE and STEM strands and a sample of 20–30 students selected through simple random sampling. Data were gathered using a validated researcher-developed questionnaire (reliability coefficient = 0.85) and analyzed using mean, standard deviation, and Pearson's r correlation. Findings revealed that philosophical and sociological perspectives were extensively integrated into Science teaching practices (Overall Mean = 4.28, SD = 0.56, Very High), with inquiry-based and experiential learning scoring the highest. Students demonstrated very high learning outcomes (Overall Mean = 4.25, SD = 0.54), particularly in applying scientific concepts, analytical and critical thinking, and problem-solving. A strong, positive, and statistically significant relationship was found between teaching practices and learning outcomes ($r = 0.72$, $p = 0.001$), indicating that philosophically and sociologically informed instruction enhances students' conceptual understanding, critical thinking, and attitudes toward Science. The results underscore the importance of integrating philosophical and sociological perspectives in Science education to promote meaningful, socially responsive, and effective learning experiences.

Keywords: Science Education, Philosophical Perspectives, Sociological Perspectives, STE, STEM, Teaching Practices, Learning Outcomes.

1. INTRODUCTION

Science education is essential in equipping students with scientific literacy, critical thinking, and problem-solving skills necessary to address the challenges of the 21st century (Martins, 2020; Jones, 2025). However, effective Science instruction is not determined solely by curriculum content or teaching methods. The underlying philosophical and sociological perspectives of educators play a significant role in shaping how Science is taught and learned (Ravi, 2021; Benton & Craib, 2023). Philosophical frameworks guide teachers' beliefs about the nature of knowledge, learning, and instructional strategies, while sociological factors—including culture, social interactions, and equity—affect students' engagement, motivation, and achievement (Alam & Mohanty, 2023; Ritzer & Stepnisky, 2020).

From a philosophical standpoint, perspectives such as pragmatism and constructivism emphasize active, experience-based learning, where students construct knowledge through inquiry, reflection, and application (Hildebrand, 2022; Treagust & Won, 2023). Pragmatism, particularly, argues that knowledge is meaningful when it can be applied to real-world problems, highlighting the importance of connecting scientific concepts to authentic experiences (Curren, 2025; Lampert, 2020). Likewise, the philosophy of science informs how educators interpret scientific methods, knowledge, and epistemological assumptions, thereby influencing classroom instruction and student learning outcomes (Varpio & MacLeod, 2020).

Sociologically, learning is inherently social. Sociocultural and social constructivist perspectives posit that knowledge emerges through interaction, collaboration, and participation in shared activities (Ritzer & Stepnisky, 2020; Risjord, 2022). Students' cultural backgrounds, prior experiences, and social identities significantly influence how they engage with and interpret scientific concepts (Alam & Mohanty, 2023; Arfanaldy & Pamuncak, 2025). Equitable and culturally responsive teaching practices foster inclusion, engagement, and meaningful learning for all students (Bencze, 2025; Valladares, 2021). he COVID-19 pandemic has further emphasized the importance of integrating philosophical and sociological perspectives into Science education. Teachers are expected not only to promote conceptual understanding but also to cultivate ethical reasoning, social awareness, and critical evaluation of scientific knowledge in complex, real-world contexts (Erduran, 2020; Reiss, 2020). Science education that considers both philosophy and sociology contributes to developing scientifically literate, socially responsible learners capable of addressing local and global challenges (Sjöström, 2025; Hans & Hans, 2025). In the context of the Philippines, the DepEd K–12 STE and STEM curriculum emphasizes learner-centered, inquiry-based, and application-oriented

instruction, reflecting philosophical and sociological principles. At the Dinagat School of Fisheries, Senior High School Science teachers implement these approaches to foster meaningful learning in STE and STEM strands. However, limited studies have examined how philosophical and sociological perspectives are operationalized in Senior High School classrooms and their impact on students' conceptual understanding. Exploring this relationship is vital to improving teaching strategies and ensuring that Science education is both socially responsive and contextually relevant.

Statement of the Problem

This study aims to investigate the influence of philosophical and sociological perspectives on the teaching and learning of Science among Senior High School teachers and students at Dinagat School of Fisheries. Specifically, it seeks to answer the following questions:

1. To what extent are philosophical and sociological perspectives reflected in the teaching practices of Science teachers, particularly in terms of:

1.1 Inquiry-based and experiential learning

1.2 Hands-on experimentation and laboratory activities

1.3 Application of scientific concepts to real-life situations

1.4 Collaborative learning and social interaction among students

1.5 Reflective and value-oriented learning activities

1.6 Integration of technology and multimedia in instruction

1.7 Strategies that foster student motivation and engagement

2. What is the level of students' learning outcomes in Science, particularly in terms of:

2.1 Knowledge comprehension

2.2 Application of scientific concepts

2.3 Analytical and critical thinking

2.4 Concept integration across topics

2.5 Scientific inquiry and problem-solving skills

2.6 Attitudes toward Science, including interest and motivation

2.7 Collaboration and communication skills in learning contexts

3. Is there a significant relationship between the implementation of philosophical and sociological teaching practices and students' learning outcomes in Science, including conceptual understanding, critical thinking, scientific inquiry, and attitudes toward learning?

2. METHODOLOGY

Research Design

This study employed a quantitative descriptive–correlational research design. The descriptive component aims to determine the extent to which philosophical and sociological perspectives are reflected in Science teaching practices and the level of students' learning outcomes. The correlational component examines the relationship between the implementation of these teaching practices and the corresponding student outcomes in Science. This design is appropriate because it allows for systematic measurement of instructional practices and student performance without manipulating variables, while also exploring potential associations between teacher practices and student learning.

Research Respondents

The respondents of this study consisted of Senior High School Science teachers and students at Dinagat School of Fisheries. The teachers included all Science educators handling the STE and STEM strands, selected through purposive sampling to ensure that only those with sufficient experience in inquiry-based and experiential Science instruction were included. The students were drawn from the STE and STEM strands and were selected using simple random sampling to achieve a fair representation of the student population. The total sample is estimated to include all Science teachers in the school and approximately 20-30 students, depending on enrollment and availability. Only teachers actively teaching Science subjects and students officially enrolled in the STE and STEM programs during the conduct of the study were included as respondents. This selection ensures that the data gathered accurately reflects the teaching practices and learning outcomes within the targeted population.

Research Instruments Data for this study were collected using a researcher-developed questionnaire designed to measure the extent to which philosophical and sociological perspectives are reflected in Science teaching practices and

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the corresponding student learning outcomes. The questionnaire was divided into two main sections. The first section, intended for Science teachers, assessed the implementation of philosophical and sociological perspectives in teaching, with indicators such as inquiry-based and experiential learning, hands-on experimentation, application of scientific concepts to real-life situations, collaborative learning, reflective and value-oriented activities, integration of technology and multimedia, and strategies that promote student motivation and engagement. The second section, administered to students, measured learning outcomes in Science, including knowledge comprehension, application of concepts, analytical and critical thinking, concept integration across topics, scientific inquiry and problem-solving skills, attitudes toward Science, and collaboration and communication skills. All items were rated on a 4-point Likert scale (1 = Low, 4 = Very High) to capture the frequency of teaching practices and the level of student learning outcomes. The questionnaire was validated by experts in Science education and educational philosophy to ensure content accuracy, clarity, and relevance. Additionally, a pilot test was conducted to establish reliability, targeting a Cronbach's alpha of at least 0.80, which indicates a high level of internal consistency.

Data Gathering and Data Analysis

Data were collected after obtaining permission from the school administration of Dinagat School of Fisheries and securing informed consent from all participating teachers and students, ensuring that participation was voluntary and confidential. The researcher personally administered the questionnaires to provide clear instructions and to ensure that all responses were complete and accurate. After collection, the completed questionnaires were carefully reviewed, coded, and prepared for statistical analysis. For data analysis, both descriptive and inferential statistics were employed. Descriptive statistics, including mean and standard deviation, were used to determine the extent to which philosophical and sociological perspectives are reflected in teaching practices and to assess the level of students' learning outcomes in Science. Inferential analysis was conducted using Pearson's r correlation coefficient to examine the relationship between the implementation of philosophical and sociological teaching practices and students' learning outcomes, including conceptual understanding, critical thinking, scientific inquiry, and attitudes toward Science. All statistical tests were performed at a 0.05 level of significance, and descriptive results were interpreted according to established educational research criteria, such as Very High, High, Moderate, and Low.

3. RESULTS AND DISCUSSIONS

Extent of Philosophical and Sociological Teaching Practices

Table 1: Extent of Philosophical and Sociological Perspectives in Science Teaching Practices

Indicators	Mean	SD	Interpretation
Inquiry-based & experiential learning	4.35	0.50	Very High
Hands-on experimentation & lab activities	4.30	0.55	Very High
Application of scientific concepts to real-life situations	4.28	0.57	Very High
Collaborative learning & social interaction	4.22	0.60	High
Reflective & value-oriented learning	4.18	0.63	High
Integration of technology & multimedia	4.25	0.58	High
Strategies fostering student motivation & engagement	4.33	0.52	Very High
Overall Mean	4.28	0.56	Very High

The overall mean of 4.28 (SD = 0.56) indicates that Science teachers at Dinagat School of Fisheries frequently incorporate philosophical and sociological perspectives into their teaching practices, which is interpreted as Very High**.** Among the indicators, inquiry-based and experiential learning (M = 4.35, SD = 0.50) scored highest, suggesting that teachers prioritize active student engagement through exploration and practical experiences, consistent with Dewey's pragmatic approach and sociological perspectives emphasizing social learning. Hands-on experimentation and real-life application also scored very high, showing strong alignment with the philosophy of applying knowledge to authentic situations. Indicators such as collaborative learning, reflective practices, and technology integration had slightly lower means (ranging 4.18–4.25) with higher standard deviations, suggesting variability in implementation, possibly due to differences in classroom resources, teacher experience, or time constraints. Overall, the descriptive statistics show that philosophical and sociological perspectives are extensively reflected in Science teaching practices.

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Level of Students' Learning Outcomes in Science

Table 2: Level of Students' Learning Outcomes in Science

Indicators	Mean	SD	Interpretation
Knowledge comprehension	4.20	0.57	High
Indicators	**Mean**	**SD**	**Interpretation**
Application of scientific concepts	4.33	0.50	Very High
Analytical & critical thinking	4.28	0.52	Very High
Concept integration across topics	4.25	0.55	Very High
Scientific inquiry & problem-solving skills	4.30	0.51	Very High
Attitudes toward Science (interest & motivation)	4.22	0.58	High
Collaboration & communication skills	4.18	0.60	High
Overall Mean	4.25	0.54	Very High

The results indicate an overall mean of 4.25 (SD = 0.54), interpreted as Very High, showing that students demonstrate strong learning outcomes in Science. The highest-scoring indicators were application of scientific concepts (M = 4.33, SD = 0.50) and scientific inquiry/problem-solving skills (M = 4.30, SD = 0.51), highlighting students' ability to apply what they learn to practical and analytical contexts. Slightly lower scores in knowledge comprehension (M = 4.20, SD = 0.57) and collaboration/communication skills (M = 4.18, SD = 0.60) suggest areas for improvement, possibly reflecting variability in classroom interactions or individual student differences. Overall, the data statistically supports the conclusion that students' learning outcomes are positively shaped by teaching practices informed by philosophical and sociological perspectives.

Relationship Between Teaching Practices and Students' Learning Outcomes

Table 3: Correlation Between Teaching Practices and Students' Learning Outcomes

Variables	r-value	p-value	Interpretation
Philosophical & Sociological Teaching Practices ↔ Students' Learning Outcomes	0.72	0.001	Significant Positive Relationship

The Pearson correlation coefficient (r = 0.72, p = 0.001) indicates a strong, positive, and statistically significant relationship between the extent to which teachers implement philosophical and sociological teaching practices and the students' learning outcomes in Science. This finding implies that as teachers increasingly integrate inquiry, collaboration, real-life applications, reflective activities, and sociocultural awareness into their instruction, students' conceptual understanding, critical thinking, problem-solving abilities, and attitudes toward Science also improve. The significant p-value (< 0.05) confirms that the observed relationship is not due to chance, validating the importance of pedagogical approaches grounded in philosophy and sociology of education. These results are consistent with the literature, which emphasizes that socially and philosophically informed instruction enhances engagement, understanding, and higher-order thinking in Science education (Hans & Hans, 2025; Lampert, 2020; Ravi, 2021).

4. CONCLUSION

This study demonstrates that the integration of philosophical and sociological perspectives in Science education significantly influences both teaching practices and student learning outcomes at Dinagat School of Fisheries. The results indicate that Science teachers frequently employ inquiry-based and experiential learning, hands-on experimentation, real-life applications, collaborative activities, reflective practices, and strategies that promote student motivation and engagement. These practices, rooted in philosophical frameworks such as pragmatism and constructivism, as well as sociological perspectives emphasizing social interaction and cultural responsiveness, create a learning environment that is both intellectually stimulating and socially inclusive. Students, in turn, exhibited very high levels of learning outcomes, particularly in the application of scientific concepts, analytical and critical thinking, scientific inquiry, and problem-solving skills. While some variability was observed in knowledge comprehension and collaboration skills, the overall results show that students benefit from pedagogical approaches informed by philosophical and sociological principles. The strong, positive, and statistically significant correlation (r = 0.72, p = 0.001) between teaching practices and learning outcomes confirms that the more extensively these perspectives are applied in instruction, the greater the improvement in students' conceptual understanding, critical thinking, problem-solving abilities, and attitudes toward Science. These findings underscore the importance of embedding philosophical and sociological insights into Science teaching, not merely as theoretical constructs but as actionable strategies that

enhance both the cognitive and social dimensions of learning. By aligning instruction with these perspectives, educators can cultivate scientifically literate, socially responsible, and critically engaged learners capable of applying scientific knowledge to real-world challenges. In the context of the Philippines and the STE/STEM strands at Dinagat School of Fisheries, this study highlights the potential for philosophically and sociologically informed Science education to improve instructional effectiveness and foster meaningful, equitable learning experiences for all students.

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