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ORIGINAL

Integrating Values Education in Science Teaching: Teachers' Perceptions and Practices

Integración de la educación en valores en la enseñanza de las ciencias: percepciones y prácticas docentes

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ABSTRACT

Introduction: this study examines how secondary science teachers perceive and implement values education in science instruction, recognizing its importance in fostering students' ethical awareness and holistic development.
Method: a mixed-methods design was used, involving 15 purposively selected teachers from three locations in Mindanao, Philippines. Quantitative data were gathered through Likert-scale questionnaires, while qualitative insights were obtained via in-depth interviews. Descriptive statistics and thematic analysis were employed.
Results: teachers expressed highly positive perceptions of integrating values in science, emphasizing its role in promoting critical thinking, social responsibility, and ethical behavior. Common practices included contextualizing lessons through real-life experiences, fostering safe classroom environments, and encouraging authentic dialogue. Reported student outcomes included improved self-discipline and environmental awareness. Challenges such as limited instructional time, difficulty aligning values with technical content, and varying student engagement were noted. Teachers addressed these through time management, contextualized teaching, and peer collaboration.
Conclusion: integrating values education in science fosters holistic learning and responsible citizenship. The study recommends targeted professional development and institutional support to strengthen values integration in science curricula.

Keywords: Values Integration; Science Education; Teacher Attitudes; Teaching Methods; Student Behavior.

RESUMEN

Introducción: este estudio examina cómo el profesorado de ciencias de secundaria percibe e implementa la educación en valores en la enseñanza de ciencias, reconociendo su importancia para fomentar la conciencia ética y el desarrollo holístico del alumnado.
Método: se empleó un diseño de métodos mixtos con 15 docentes seleccionados intencionalmente de tres localidades de Mindanao, Filipinas. Los datos cuantitativos se recopilaron mediante cuestionarios de escala Likert, mientras que los cualitativos se obtuvieron mediante entrevistas en profundidad. Se emplearon estadísticas descriptivas y análisis temático.
Resultados: el profesorado expresó una percepción muy positiva de la integración de valores en ciencias, destacando su papel en la promoción del pensamiento crítico, la responsabilidad social y el comportamiento ético. Las prácticas comunes incluyeron contextualizar las lecciones a través de experiencias de la vida real, fomentar entornos de clase seguros y fomentar el diálogo auténtico. Los resultados estudiantiles reportados incluyeron una mayor autodisciplina y conciencia ambiental. Se observaron desafíos como el tiempo de instrucción limitado, la dificultad para alinear los valores con el contenido técnico y la participación variable del alumnado. El profesorado los abordó mediante la gestión del tiempo, la enseñanza contextualizada y la colaboración entre pares.
Conclusión: la integración de la educación en valores en ciencias fomenta el aprendizaje holístico y la ciudadanía responsable. El estudio recomienda desarrollo profesional específico y apoyo institucional para fortalecer la integración de valores en los currículos de ciencias.

Palabras clave: Integración de Valores; Educación Científica; Actitudes Docentes; Métodos de Enseñanza; Comportamiento Estudiantil.

INTRODUCTION

Values education is a fundamental component of holistic educational practices, preparing students not only academically but also morally and socially. The integration of values within educational curricula fosters responsibility, civic engagement, and ethical decision-making, all of which are crucial in a globally interconnected society. Koshy et al.[1] emphasize that higher education is deeply intertwined with personal and social value development, illustrating the interplay between cultural change and the persistence of traditional values in students' ethical growth. This aligns with Acharya[2], who asserts that value education is essential in contemporary curricula, reinforcing national educational policies that prioritize moral education as vital for societal cohesion and personal development. The focus on values in higher education should thus aim to cultivate individuals capable of navigating modern complexities while maintaining a strong ethical framework.

While values education significantly impacts students' moral and social growth, its integration into science education offers an opportunity to enhance ethical awareness in scientific practices. Studies conducted by Fernando and Yusnan[3] highlight how values rooted in local culture can be seamlessly incorporated into educational settings, enriching students' learning experiences by fostering cultural appreciation and social responsibility. Similarly, Sukirno et al.[4] demonstrate that character education fosters essential life skills and positive traits, which contribute to students' ability to engage thoughtfully within their respective communities. These perspectives underscore the importance of values education as a means of preparing future leaders for ethical decision-making and constructive societal engagement.

Despite the recognized benefits of values education, its integration into science teaching remains a challenge. Many educators struggle with incorporating ethical considerations into science curricula due to inadequate training and resource limitations. Jeong et al.[5] argue that as the world faces significant ecological and ethical challenges in the Anthropocene era, science education must foster an awareness of sustainability and ethical responsibility. This includes not only imparting scientific knowledge but also encouraging critical thinking about the consequences of scientific advancements and students' roles as responsible citizens. When values education is embedded within science curricula, it enhances students' ability to critically assess socio-scientific issues, thereby improving their decision-making skills and contributions to societal discourse.[6]

Furthermore, integrating ethical considerations into science education fosters students' understanding of their responsibilities in an evolving world. Rahmawati et al.[7] highlight that incorporating ethical reasoning into science teaching equips students with the necessary skills to confront challenges arising from scientific advancements, particularly in culturally diverse contexts. This framework not only cultivates ethical awareness but also supports students in understanding how scientific literacy informs ethical decision-making across various societal domains. By aligning values education with science curricula, educators contribute to developing future professionals who are both scientifically competent and ethically conscious.[8]

Despite these benefits, integrating values education into science teaching presents challenges, particularly concerning pedagogical training and resource availability. Many educators feel unprepared to incorporate ethical and social considerations into their lessons due to a lack of professional development opportunities in values education.[9] Pre-service and in-service teacher education programs often do not adequately address how to merge values education with scientific content, resulting in insufficient preparation for meaningful integration.[10] Additionally, the scarcity of teaching resources designed for values-based instruction within science curricula hinders teachers' ability to engage students in discussions about the ethical implications of scientific advancements.[11] Consequently, without adequate institutional support, the integration of values education may remain superficial, limiting educators' ability to effectively convey both scientific knowledge and ethical understanding.

Conflicting curricular demands further complicate this integration. Teachers are often pressured to adhere to standardized testing requirements, leaving little room to explore socio-scientific issues and ethical discussions.[12] This restriction limits students' opportunities to engage critically with the ethical dimensions of science.[13] Therefore, a systemic shift in educator preparation and institutional support is essential to emphasize values education's role in both teaching practices and educational outcomes.

Effectively addressing these challenges requires professional development programs that equip educators with the skills necessary to integrate ethical discussions and socio-scientific issues into their science curricula. Monsalve-Silva et al.[14] suggest that targeted training enhances teachers' ability to merge scientific knowledge with ethical considerations, fostering students' holistic understanding of science's societal impact. Leveraging technology to develop interactive teaching materials, such as e-modules that emphasize character education alongside scientific learning, can also enhance values integration.[15] Additionally, interdisciplinary approaches that combine scientific inquiry with values-based education enable students to explore ecological and ethical dimensions of scientific topics, encouraging critical thinking and informed decision-making. Prioritizing these strategies will help create an ethically aware science education framework that prepares students for responsible citizenship.

This study aims to explore secondary science teachers' perceptions and instructional practices related to the integration of values education in science teaching. Specifically, it seeks to address the following research questions:

1. What are teachers' perceptions of integrating values education in science teaching?
2. What instructional practices do teachers employ to integrate values education into science teaching?

The general objective of this research is to examine how values education is conceptualized and enacted within science instruction, with the goal of understanding its role in fostering students' ethical awareness and holistic development. By addressing these questions, the study contributes to the broader discourse on values integration in science curricula and offers pedagogical insights for promoting responsible, ethically grounded scientific literacy among learners.

METHOD

This study employed a descriptive research design using a mixed-methods approach to examine secondary science teachers' perceptions and practices in integrating values education into science instruction. The combination of quantitative and qualitative methods allowed for both broad patterns and in-depth insights to be captured, enriching the interpretation of the data.

A total of 15 secondary science teachers were purposively selected from three locations: Sultan Naga Dimaporo, Lanao del Norte (5 teachers); Rizal, Claveria, Misamis Oriental (5 teachers); and Iligan City (5 teachers). Purposive sampling was employed to ensure participants had relevant experience and active involvement in teaching science at the secondary level. Demographic information such as age, sex, educational attainment, and years of teaching science was also collected to contextualize the analysis.

For the quantitative component, a structured questionnaire using a four-point Likert scale was administered to assess teachers' perceptions and practices. The instrument underwent expert validation by three education professionals specializing in science education and curriculum development. A pilot test was conducted with five non-participant science teachers to check for clarity and reliability, leading to minor revisions prior to full deployment.

The qualitative component involved semi-structured interviews with the same respondents. The interview protocol was also validated by experts and guided by the study's research questions. This approach provided deeper insights into the participants lived experiences, perceived challenges, and instructional strategies related to values integration.

Data analysis involved descriptive statistics (mean, standard deviation) for the quantitative data to identify trends in teachers' responses. For qualitative data, thematic analysis was used to derive recurring themes and

patterns, which were coded and organized based on emergent concepts.

Ethical approval was secured prior to data collection. All participants provided informed consent, and confidentiality was maintained through anonymization of responses. Participation was entirely voluntary, and respondents were assured that they could withdraw at any time.

This methodological framework enabled a comprehensive exploration of how values education is conceptualized and practiced in science teaching, thereby contributing meaningful insights to ongoing efforts in enhancing character-based science education.

RESULTS

Table 1. Teachers' Perception in Integrating Values Education in Teaching Science

Indicators	Weighted Mean	Standard Deviation	Verbal interpretation
1. Integrating values education teaches students to understand the nature of science.	3,87	0,35	Highly Positive
2. Integrating values education in teaching Science increases the ability to make decisions, think critically and creatively.	3,73	0,46	Highly Positive
3. Integrating values education in teaching Science increases students' ability to identify, assess, and transfer information needed for solving novel problems.	3,60	0,63	Highly Positive
4. Integrating values education in teaching Science promotes cooperative learning and a better attitude towards oneself as a learner and as a meaningful member of the economy.	3,80	0,41	Highly Positive
5. Integrating values education in teaching Sciences increases overall comprehension of global interdependencies, along with the development of multiple perspectives and points of view as well as values.	3,87	0,35	Highly Positive
Grand Weighted Mean	3,77	0,35	Highly Positive

Source: Adapted and modified from the research of Mohamad et al.[9]

The table 1 above presents teachers' perceptions of integrating values education in teaching science, showing a highly positive consensus across all indicators. The highest-rated aspects include helping students understand the nature of science (3,87) and fostering global awareness and ethical perspectives (3,87). Teachers also strongly agree that values education enhances critical thinking, creativity, and decision-making skills (3,73) and improves problem-solving abilities by enabling students to identify, assess, and apply knowledge in novel situations (3,60). Furthermore, it promotes cooperative learning and a positive attitude toward personal growth (3,80), highlighting its role in shaping responsible learners and citizens. With a Grand Weighted Mean of 3,77 and a Standard Deviation of 0,35, responses are generally consistent, reinforcing the idea that integrating values education into science teaching is beneficial. These findings suggest that science education should go beyond imparting knowledge and also develop students' ethical reasoning, collaboration, and global awareness, ensuring they become not just scientifically literate but also socially responsible individuals.

Table 2. Teachers' Practices in Integrating Values Education in teaching Science

Indicators	Weighted Mean	Standard Deviation	Verbal interpretation
1. I used stories of diverse people and life experiences in teaching Science.	3,33	0,62	Highly Practiced
2. I used problem solving in science that is culturally relevant in the learners' broader community.	3,40	0,63	Highly Practiced
3. I created "safe space" in the classroom where students can ask anonymous questions about vocabulary and terms during subject instruction.	3,87	0,35	Highly Practiced
4. I made sure that authentic dialogues of understanding among the students are present.	3,73	0,46	Highly Practiced
5. I helped students connect life experiences to learning Science.	3,87	0,35	Highly Practiced
Grand Weighted Mean	3,64	0,34	Highly Practiced

Table 2 presents a comprehensive overview of teachers' practices in integrating values education in teaching

science. The data reveals that all five identified indicators are "Highly Practiced," with a Grand Weighted Mean of 3,64 and a relatively low Standard Deviation of 0,34, indicating strong and consistent engagement across respondents. Among the indicators, the highest-rated practices include creating a "safe space" for anonymous student inquiries and helping learners connect life experiences to science (both with a mean of 3,87), reflecting a strong emphasis on inclusivity, psychological safety, and relevance in the classroom. These strategies support the development of critical thinking and emotional intelligence by encouraging open discussions and contextualizing science in students' daily lives. Authentic dialogue among students was also highly practiced (mean = 3,73), highlighting efforts to promote collaboration and mutual understanding. Meanwhile, culturally relevant problem-solving (mean = 3,40) and the use of diverse life stories (mean = 3,33) were practiced slightly less frequently, possibly due to contextual challenges or a lack of training in culturally responsive pedagogy. Nevertheless, the findings affirm that science educators are actively embedding values education into their instructional methods, promoting not only academic learning but also the holistic development of learners. These practices help bridge science with societal issues and foster responsible citizenship, underscoring the importance of integrating cognitive and affective domains in education.

Teachers' views on integrating Values Education in teaching Science

Through face-to-face interviews using in-depth interview questions, teachers were asked on their views on integrating values education in teaching Science. The following themes were made based on their responses:

Table 3. Teachers' views on integrating Values Education in teaching Science

Theme	Description	Representative Quote
The Vital Role of Integrating Values in Science	Teachers emphasize the importance of integrating values for intellectual and moral development in science learning.	"Teaching and learning science are incomplete without the integration of values." (ST2)
Fostering Positive Attitudes through Values Education	Values education helps foster positive learning attitudes such as discipline, responsibility, and scientific mindset.	"It helps discipline students… teaches them to handle materials with care." (ST5)
Real-Life Contextualization as a Strategy	Teachers use real-life scenarios to make science content relatable and values-based.	"I use family dynamics as an analogy to explain equilibrium." (ST4)
Behavioral Transformation Among Students	Integration of values leads to noticeable behavioral changes like increased responsibility and environmental awareness.	"After learning about waste segregation, students became more mindful." (ST5)
Unintentional but Present Integration	Some teachers integrate values unconsciously but inconsistently, signaling a need for intentional planning.	"I realized I have done so… though only occasionally and in certain topics." (ST3)
Cultivating Responsibility and Community Awareness	Students become more reflective, environmentally aware, and conscious of their roles in the community.	"They develop a deep understanding of their role as stewards of nature." (CT3)
Emphasis on Self-Discipline	Self-discipline is seen as a foundational value that enables academic and personal success.	"If a youngster has self-discipline, they will be able to have a successful future." (ST3)
Deterioration of Values Integration	Challenges like time constraints and content complexity hinder full integration of values education.	"It's hard to integrate values in lessons like balancing equations…" (ST5)
Specific Challenges Encountered	Main challenges include time limitations and difficulty aligning values with technical science topics.	"Lessons are already time-intensive… integrating values makes it more challenging." (ST1)
Coping Strategies to Sustain Values Integration	Teachers apply strategies like time management, peer support, and real-life contextualization to sustain integration.	"Plan ahead and find examples grounded in students' actual lives." (ST4)

Source: Adapted and modified from Khathi, Ajani, and Govendar (2003).

The table 3 above underscores the essential role of values education in science instruction, as reflected in the perceptions and practices of secondary science teachers. Participants consistently emphasized that values integration is integral to developing not only scientific understanding but also ethical awareness, self-discipline, and civic responsibility. Strategies such as the use of real-life scenarios and contextualized examples were reported to enhance student engagement and make scientific concepts more meaningful. Teachers observed notable behavioral improvements among students—including increased responsibility, environmental consciousness, and honesty—indicating that values-based instruction can lead to both cognitive and affective

development. Some respondents also became aware that they had been integrating values unconsciously, highlighting the potential for more intentional and structured pedagogical planning.

DISCUSSION

Integrating values education into science teaching is increasingly recognized as essential in shaping students not only as knowledgeable scientists but also as responsible individuals. Nordqvist and Jidesjö[16] highlight that teachers' non-epistemic values influence both their instructional practices and students' engagement, underscoring the critical role values play in making science education relevant and impactful. Similarly, Yaman and Anılan[17] argue that embedding values into science lessons supports students' moral development and promotes a more holistic understanding of scientific concepts. This approach not only improves academic outcomes but also nurtures a sense of social responsibility, enabling students to connect scientific knowledge with real-world ethical implications.[18] Thus, integrating values in science education is vital for cultivating informed citizens capable of thoughtfully engaging with ethical dimensions of scientific inquiry and contributing positively to society.

Science educators are increasingly incorporating values into their instructional methods, recognizing the importance of fostering ethical reasoning and civic awareness. As Yaman and Anılan[19] further contend, integrating values into the science curriculum deepens student understanding and encourages appreciation of the social aspects of scientific issues, ultimately promoting responsible citizenship. Pramila-Savukoski et al.[20] similarly emphasize the need for ethics and evidence-based practice in healthcare education, highlighting the importance of values-oriented teaching in scientific fields. Complementing this, Chan and Erduran[21] demonstrate how interdisciplinary collaboration—particularly between science and religious education—broadens teachers' perspectives on argumentation and ethical instruction. Collectively, these studies suggest that embedding values within science pedagogy strengthens students' ability to thoughtfully navigate complex socio-scientific issues.

Furthermore, values education should be more intentionally and systematically integrated into science teaching to address the ethical and societal responsibilities students encounter. Groot and Abma[22] advocate for ethically grounded practices in citizen science frameworks, stressing that ethics must be an intrinsic part of both scientific research and education. In the medical and health sciences, Faihs et al.[23] report that ethics education enhances students' capacity to handle complex dilemmas, while Olaiya et al.[24] argue that linking biomedical sciences with ethical reasoning enriches the learning experience and fosters a comprehensive understanding of science and ethics. Similarly, Kudaibergenova et al.[25] highlight the value of interactive, web-based learning in developing students' ethical awareness and decision-making skills. Together, these studies reinforce the argument that intentional values integration not only promotes ethical reasoning but also prepares learners to respond responsibly to future scientific and societal challenges.

Despite these positive outcomes, several barriers to consistent implementation remain. Teachers report challenges such as limited instructional time, difficulty aligning values with complex scientific content, and pressures to meet curriculum demands. Nonetheless, they employ coping strategies such as time management, reflective practice, contextualized instruction, and peer collaboration to sustain their efforts. These findings suggest that while educators are committed to values integration, its long-term success requires institutional support, professional development opportunities, and curriculum frameworks that explicitly prioritize ethical education. This study, therefore, contributes to the growing discourse on holistic science education and advocates for a shift toward ethically grounded instructional practices.

Fuadaturrahmah et al.[26] emphasize that advancing the human sciences depends on embedding both values and critical thinking into the curriculum, calling on institutions to promote ethical education as part of their academic mandate. Zarestky et al.[27] further highlight that professional development—especially in informal settings like biological field stations—can foster meaningful connections between scientific knowledge and societal values. Similarly, Amirshokoohi et al.[28] demonstrate how comprehensive curriculum reform that incorporates values education helps bridge the gap between scientific understanding and ethical practice. These insights reinforce the need for strong institutional backing to ensure that values education becomes an embedded and sustained component of science teaching. Without such support, the full potential of values integration in science education may remain unrealized.

CONCLUSION

This study highlights the crucial role of values education in fostering holistic student development within science instruction. While teachers generally recognize its importance, the findings reveal varied levels of awareness and intentionality in their integration practices. Values education was shown to positively influence students' attitudes, self-discipline, and sense of responsibility, especially when embedded in real-life, contextualized science lessons.

Despite clear benefits, challenges such as time constraints, topic alignment, and student engagement hinder

consistent implementation. Nonetheless, teachers adopt practical strategies—such as time management, contextualization, and peer collaboration—to navigate these barriers. To support sustained integration, the study recommends targeted professional development and institutional frameworks that explicitly guide and prioritize values education in science curricula. Future research should further explore its long-term effects on student behavior and academic outcomes, ensuring science education nurtures both inquiry and ethical responsibility.

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