

From Consumer Awareness to Environmental Stewardship: Lived Experiences of Bachelor of Technology and Livelihood Education Students at Don Mariano Marcos Memorial State University in Promoting Clean and Green Practices for Sustainable Life Sciences

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Abstract

Environmental sustainability has become a fundamental concern in higher education as institutions strive to develop graduates who are environmentally responsible, socially accountable, and capable of promoting sustainable development. Within Technology and Livelihood Education (TLE), Consumer Education provides learners with the knowledge, values, and competencies necessary to make informed decisions regarding resource utilization, waste management, environmental conservation, and sustainable consumption. Despite the growing emphasis on environmental education, limited qualitative studies have explored how Bachelor of Technology and Livelihood Education (BTLEd) students translate consumer education into clean and green environmental practices that contribute to sustainable life sciences. This study explored the lived experiences of BTLEd students at Don Mariano Marcos Memorial State University in promoting clean and green practices through the lens of consumer education and environmental stewardship. Employing a descriptive phenomenological research design, the study purposively selected fifteen (15) BTLEd students actively engaged in environmental and sustainability-related activities. Data were gathered through semi-structured, in-depth interviews and analyzed using Colaizzi's seven-step phenomenological method. The findings revealed five major themes: (1) Developing Environmental Consciousness through Consumer Education; (2) Translating Sustainable Knowledge into Daily Environmental Practices; (3) Experiencing Challenges in Maintaining Sustainable Behaviors; (4) Strengthening Environmental Stewardship through Community Participation; and (5) Envisioning Future Roles as Environmentally Responsible Educators. The participants emphasized that consumer education extends beyond responsible purchasing and consumption, fostering ecological responsibility, resource conservation, and sustainable lifestyles. Their experiences highlight the vital role of higher education in nurturing future educators who can integrate environmental sustainability into teaching and community engagement. The study proposes an Environmental Stewardship Integration Framework that may guide curriculum enhancement, institutional sustainability initiatives, and environmental education programs within Technology and Livelihood Education. The findings contribute to the growing body of literature on life sciences education, consumer education, and sustainable development in higher education.

Introduction

Environmental degradation, biodiversity loss, pollution, improper waste disposal, and unsustainable patterns of production and consumption have become pressing

global challenges that threaten ecological balance and human well-being. The United Nations Sustainable Development Goals (SDGs), particularly SDG 4 (Quality Education), SDG 12 (Responsible Consumption and Production), SDG 13

(Climate Action), and SDG 15 (Life on Land), emphasize the importance of education in cultivating environmentally responsible citizens capable of addressing these interconnected environmental issues. Higher education institutions are therefore expected to develop graduates who not only possess disciplinary knowledge but also demonstrate environmental ethics, sustainable decision-making, and active participation in conservation efforts.

Life sciences education has increasingly recognized that environmental sustainability is inseparable from human health, ecological integrity, food security, and community resilience. Consequently, universities around the world have integrated sustainability concepts across curricula to prepare future professionals who can balance economic development with environmental conservation. Environmental literacy, ecological awareness, and sustainable behavior are no longer viewed as supplementary educational outcomes but as essential competencies that enable graduates to respond effectively to contemporary environmental challenges. Numerous international studies have demonstrated that sustainability education positively influences students' environmental attitudes, ecological values, and pro-environmental behaviors, reinforcing the role of higher education in achieving sustainable development.

Within the Philippine educational context, environmental protection has become an

integral component of national educational policies and institutional mandates. The Ecological Solid Waste Management Act of 2000 (Republic Act No. 9003), the Philippine Environmental Education Act of 2008 (Republic Act No. 9512), and various initiatives of the Commission on Higher Education encourage higher education institutions to integrate environmental education into instruction, research, extension, and community engagement. These policies recognize that environmental sustainability requires behavioral transformation alongside scientific knowledge, making education a strategic instrument for cultivating responsible environmental citizenship among Filipino learners.

Consumer education represents one of the fundamental learning areas within Technology and Livelihood Education (TLE). Traditionally, consumer education equips learners with competencies related to informed purchasing, financial literacy, product evaluation, consumer rights, and responsible consumption. However, contemporary perspectives have expanded its scope to include sustainable consumption, ethical consumerism, waste reduction, resource conservation, recycling, circular economy principles, and environmentally responsible lifestyles. As consumers become increasingly influential in shaping production systems and environmental outcomes, consumer education has evolved into a significant mechanism for promoting environmental sustainability and ecological stewardship.

Bachelor of Technology and Livelihood Education (BTLEd) students occupy a unique position in advancing environmental sustainability because they are preparing to become future educators responsible for developing environmentally conscious learners. Through courses in consumer education, entrepreneurship, food management, household resource management, agriculture, industrial arts, and livelihood education, BTLEd students encounter numerous opportunities to apply sustainability principles in both academic and community settings. Their experiences in practicing waste segregation, recycling, resource conservation, energy efficiency, sustainable food preparation, responsible purchasing, and environmental advocacy demonstrate how consumer education can translate into meaningful environmental action.

Don Mariano Marcos Memorial State University (DMMMSU), as one of Northern Luzon's leading higher education institutions, actively supports environmental sustainability through various clean and green programs, campus beautification projects, ecological solid waste management initiatives, tree-planting activities, community extension programs, and sustainability-oriented student organizations. These institutional efforts provide authentic learning environments where BTLEd students can transform classroom knowledge into practical environmental stewardship. Such experiences contribute to the

development of values, attitudes, and competencies that extend beyond academic achievement toward lifelong environmental responsibility.

Despite the increasing implementation of environmental programs in higher education, existing studies have largely focused on measuring students' environmental knowledge, attitudes, awareness, or participation using quantitative approaches. While these investigations have contributed valuable information regarding environmental literacy, they often overlook the personal meanings, lived experiences, motivations, and transformative learning processes that influence students' adoption of sustainable environmental behaviors. In particular, limited qualitative evidence exists regarding how consumer education shapes the environmental stewardship experiences of BTLEd students within the context of sustainable life sciences.

Furthermore, previous research has seldom explored the intersection of consumer education, environmental sustainability, and life sciences from a phenomenological perspective. Understanding students' lived experiences provides richer insights into how environmental values are developed, internalized, and translated into meaningful actions. Such understanding is essential for designing educational programs that move beyond knowledge acquisition toward behavioral transformation, ecological responsibility, and sustainable citizenship.

Addressing this research gap is particularly important because future Technology and Livelihood Education teachers will influence the environmental attitudes and sustainable behaviors of succeeding generations. Their capacity to integrate consumer education with environmental stewardship can significantly contribute to building environmentally resilient communities and advancing the goals of sustainable development.

Hence, this study explored the lived experiences of Bachelor of Technology and Livelihood Education students at Don Mariano Marcos Memorial State University in promoting clean and green practices through consumer education as a pathway toward sustainable life sciences. The findings are expected to contribute to environmental education literature, strengthen curriculum development in Technology and Livelihood Education, support institutional sustainability initiatives, and provide practical insights for educators, policymakers, and higher education institutions committed to advancing environmental stewardship through education.

Research Gap

Although numerous studies have investigated environmental awareness, sustainable consumption, and green practices among university students, the majority have relied on quantitative survey designs that primarily measure environmental attitudes, knowledge, and behavioral intentions. Such approaches

provide limited understanding of how students personally experience environmental stewardship as part of their educational journey. Moreover, studies integrating consumer education, Technology and Livelihood Education, and sustainable life sciences remain scarce, particularly within Philippine higher education. Little is known about how BTLED students internalize consumer education principles and transform them into authentic clean and green environmental practices that shape their professional identities as future educators. Consequently, there is a significant need for a phenomenological investigation that explores these lived experiences and generates context-specific evidence to enhance environmental education, curriculum development, and sustainability initiatives in teacher education institutions.

Theoretical Foundation

This study is anchored on Experiential Learning Theory (Kolb, 1984), which posits that meaningful learning occurs through the transformation of experience into knowledge, reflection, conceptualization, and active experimentation. BTLED students acquire environmental competencies by engaging directly in clean and green activities, reflecting on these experiences, and applying sustainable practices in academic and community contexts.

The study is further grounded in the Theory of Planned Behavior (Ajzen, 1991), which explains that environmental

behaviors are influenced by individuals' attitudes, perceived social norms, and perceived behavioral control. Consumer education enhances positive environmental attitudes and strengthens students' intentions to practice responsible consumption and environmental stewardship.

Finally, the study is informed by Education for Sustainable Development (ESD), which advocates integrating sustainability principles into teaching and learning to develop environmentally responsible citizens capable of promoting ecological balance, social responsibility, and sustainable development.

Research Questions

This study sought to explore the lived experiences of Bachelor of Technology and Livelihood Education students at Don Mariano Marcos Memorial State University in promoting clean and green practices through consumer education for sustainable life sciences.

Specifically, it sought to answer the following questions:

1. How do BTLEd students describe their lived experiences in promoting clean and green environmental practices through consumer education?
2. What consumer education experiences have influenced their environmental stewardship?

3. What challenges do they encounter in sustaining environmentally responsible practices?
4. What coping strategies do they employ to maintain sustainable environmental behaviors?
5. How can the findings inform the development of an Environmental Stewardship Integration Framework for Technology and Livelihood Education programs?

Consumer Education and Sustainable Environmental Practices

Consumer education has evolved beyond teaching individuals how to purchase goods wisely into a multidisciplinary field that promotes responsible consumption, environmental accountability, and sustainable living. Contemporary literature emphasizes that informed consumer behavior significantly influences environmental quality because everyday purchasing decisions affect resource utilization, waste generation, biodiversity conservation, and climate change mitigation. Consequently, consumer education has become an important component of Education for Sustainable Development (ESD), encouraging learners to make environmentally responsible decisions that support both human well-being and ecological sustainability.

The United Nations Sustainable Development Goals, particularly SDG 12

(Responsible Consumption and Production), recognize consumer education as a critical strategy for achieving sustainable development by promoting efficient resource utilization, reducing waste generation, and encouraging environmentally responsible lifestyles. Sustainable consumption requires individuals not only to understand environmental issues but also to translate environmental knowledge into daily behaviors that minimize ecological footprints. Therefore, higher education institutions are increasingly integrating sustainability concepts into academic programs to cultivate environmentally responsible graduates capable of addressing complex environmental challenges.

Recent reviews of sustainability education highlight that higher education has shifted from merely transmitting environmental knowledge toward developing sustainability competencies through transformative learning, interdisciplinary instruction, and authentic community engagement. These approaches encourage students to become active agents of environmental change rather than passive recipients of information.

Consumer education within Technology and Livelihood Education (TLE) is particularly significant because it integrates financial literacy, responsible purchasing, waste reduction, resource conservation, recycling, ethical consumption, and sustainable household management. These competencies enable

future educators to model environmentally responsible behaviors while promoting sustainability among learners and communities.

Environmental Stewardship in Higher Education

Environmental stewardship refers to the responsible management, protection, and conservation of natural resources through environmentally sustainable behaviors and collective environmental action. Universities have increasingly recognized their responsibility to prepare graduates who possess not only scientific knowledge but also environmental ethics, ecological responsibility, and civic engagement necessary for sustainable development.

Environmental stewardship extends classroom learning into campus operations, research, extension programs, and community engagement. Through participation in tree-planting activities, solid waste management programs, biodiversity conservation, ecological restoration, and environmental advocacy, university students develop practical competencies that strengthen their environmental identities and commitment to sustainability.

Recent scholarship indicates that universities implementing sustainability-oriented programs significantly enhance students' environmental awareness, eco-consciousness, and stewardship behaviors. Students who actively participate in institutional environmental initiatives demonstrate stronger

ecological values and greater willingness to engage in sustainable practices beyond the university setting.

Similarly, institutional integration of sustainability across teaching, research, campus management, and extension services creates authentic learning environments where students develop lifelong environmental responsibility rather than temporary environmental awareness. Such holistic approaches are increasingly recommended for higher education institutions seeking to contribute meaningfully to sustainable development.

Education for Sustainable Development and Life Sciences

Education for Sustainable Development (ESD) serves as one of the principal educational frameworks for integrating sustainability into higher education curricula. UNESCO defines ESD as an educational approach that empowers learners with the knowledge, skills, attitudes, and values necessary to create sustainable societies. Within life sciences, ESD encourages understanding of ecological relationships, biodiversity conservation, environmental health, food systems, climate resilience, and sustainable resource management.

Life sciences education naturally intersects with environmental sustainability because human health, ecosystem integrity, agriculture, biodiversity, and food security are interconnected. Consequently, integrating

sustainability into life sciences allows students to appreciate the reciprocal relationships between humans and natural ecosystems while fostering scientific literacy and ecological responsibility.

Recent literature demonstrates that sustainability education in higher education increasingly adopts transformative pedagogies emphasizing experiential learning, interdisciplinary collaboration, systems thinking, and real-world environmental problem-solving. These pedagogical approaches cultivate sustainability competencies essential for addressing contemporary environmental challenges.

Furthermore, studies suggest that sustainability education strengthens learners' environmental ethics by allowing them to experience environmental problems firsthand through service learning, community engagement, and environmental extension activities, thereby encouraging long-term behavioral transformation rather than short-term knowledge acquisition.

Clean and Green Practices among University Students

Clean and green practices represent practical expressions of environmental stewardship that include waste segregation, recycling, composting, tree planting, energy conservation, water management, sustainable consumption, and campus beautification initiatives. These practices enable students to apply

environmental knowledge in everyday life while contributing to institutional sustainability goals.

Research consistently indicates that students who participate in environmental programs develop stronger ecological identities and greater commitment to environmental protection. Environmental participation provides experiential learning opportunities that enhance environmental literacy while strengthening students' confidence in addressing environmental challenges.

A recent Philippine study found that university students exhibited high levels of environmental awareness, eco-consciousness, and environmental stewardship, particularly when supported by institutional sustainability initiatives and environmental education programs. The study recommended sustaining and intensifying campus environmental programs because environmental awareness, eco-consciousness, and stewardship mutually reinforce one another.

Likewise, studies examining university-based environmental initiatives such as coastal clean-up activities demonstrate that direct participation cultivates civic responsibility, ecological awareness, volunteerism, and social accountability among students. Environmental engagement enables learners to connect classroom instruction with meaningful environmental action, thereby strengthening their commitment to sustainable living.

Technology and Livelihood Education as a Vehicle for Environmental Sustainability

Technology and Livelihood Education occupies a strategic position in promoting environmental sustainability because many of its learning competencies involve food preparation, agriculture, entrepreneurship, consumer education, household management, industrial arts, and community development. These learning areas inherently require responsible resource utilization and environmentally sustainable practices.

Within consumer education, students learn to evaluate products not only based on economic value but also according to environmental consequences. Responsible purchasing, waste minimization, recycling, product life-cycle awareness, and ethical consumption have become integral components of contemporary consumer education. Consequently, BTLEd students are expected to become future educators capable of integrating sustainability concepts into classroom instruction while modeling environmentally responsible behaviors.

The integration of sustainability into TLE also aligns with life sciences by emphasizing food safety, ecological agriculture, nutrition, biodiversity conservation, and environmental health. Such interdisciplinary learning prepares future teachers to address environmental issues holistically through education, research, and community engagement.

Experiential Learning and Environmental Stewardship

Experiential learning has become one of the dominant pedagogical approaches for sustainability education. Kolb's Experiential Learning Theory argues that meaningful learning occurs when learners actively engage in authentic experiences, reflect upon those experiences, conceptualize new knowledge, and apply learned concepts to future situations.

Environmental education particularly benefits from experiential learning because students acquire deeper understanding through participation rather than observation alone. Activities such as tree planting, ecological restoration, waste segregation campaigns, recycling projects, composting, and environmental extension programs allow learners to internalize sustainability principles through direct engagement.

Current reviews identify transformative learning and experiential pedagogies as among the most influential approaches in sustainability education because they facilitate behavioral change, systems thinking, and long-term environmental commitment. These pedagogies encourage learners to critically examine their environmental values while developing competencies necessary for sustainable living.

Philippine Context of Environmental Education

The Philippines has institutionalized environmental education through

legislative measures, particularly the Philippine Environmental Awareness and Education Act of 2008 (Republic Act No. 9512), which mandates the integration of environmental education across all educational levels. The law recognizes education as a critical mechanism for developing environmentally responsible citizens capable of addressing national and global environmental challenges.

Earlier work on environmental education in Philippine higher education observed that universities have increasingly embedded environmental sustainability into curricula, research, extension services, and campus governance, although implementation remains uneven across institutions. Continued institutional commitment is needed to strengthen Education for Sustainable Development through interdisciplinary teaching, faculty development, and community partnerships.

More recent Philippine studies likewise emphasize that environmental education contributes to students' eco-consciousness and environmental stewardship, while climate education initiatives foster youth agency, intergenerational learning, and action competence that extend environmental responsibility beyond schools into homes and communities.

Synthesis of the Literature

The reviewed literature consistently demonstrates that consumer education, environmental stewardship, Education for

Sustainable Development, and experiential learning collectively contribute to cultivating environmentally responsible individuals. Higher education institutions play a pivotal role by integrating sustainability into curricula, campus operations, research, and community engagement, thereby enabling students to transform environmental awareness into meaningful action. Recent scholarship further underscores the importance of transformative pedagogy, interdisciplinary learning, and authentic environmental experiences in developing sustainability competencies among university students.

Despite these developments, most existing studies have relied on quantitative approaches that assess environmental knowledge, attitudes, or behavioral intentions. Comparatively fewer investigations have explored how university students personally experience consumer education as a catalyst for environmental stewardship, particularly among Bachelor of Technology and Livelihood Education students whose future professional roles involve teaching sustainable practices. Likewise, limited qualitative evidence examines how clean and green initiatives shape students' environmental identities within the context of sustainable life sciences in Philippine higher education.

These gaps justify the present phenomenological investigation, which seeks to understand the lived experiences of BTLED students at Don Mariano Marcos

Memorial State University in translating consumer education into environmental stewardship through clean and green practices. The findings are expected to enrich environmental education literature while informing curriculum enhancement, sustainability initiatives, and teacher preparation programs.

Methodology

This study employed a descriptive phenomenological research design to explore the lived experiences of Bachelor of Technology and Livelihood Education (BTLED) students at Don Mariano Marcos Memorial State University (DMMMSU) in promoting clean and green practices through consumer education for sustainable life sciences. Phenomenology was deemed appropriate because it seeks to understand and describe the essence of individuals' lived experiences concerning a particular phenomenon (Moustakas, 1994). Guided by Husserl's descriptive phenomenology, the study focused on capturing participants' perceptions, meanings, and interpretations while minimizing researcher bias through the process of bracketing (Husserl, 1970; Giorgi, 2009). The research was conducted at DMMMSU, a state university in Region I, Philippines, recognized for its active implementation of environmental sustainability initiatives, including ecological solid waste management, tree-planting programs, campus beautification, environmental conservation projects, and community extension activities that provide authentic learning opportunities

for students. The participants consisted of fifteen (15) Bachelor of Technology and Livelihood Education students selected through purposive sampling, ensuring that each participant had completed or was enrolled in Consumer Education or related Technology and Livelihood Education courses, actively participated in environmental or sustainability-related activities, willingly consented to participate, and possessed the ability to articulate their lived experiences. Data collection continued until data saturation was achieved, consistent with qualitative research principles (Creswell & Poth, 2018; Patton, 2015). Data were gathered through researcher-developed semi-structured interview guides, which were validated by three experts in qualitative research, environmental education, and Technology and Livelihood Education to establish content validity. Prior to the actual data collection, a pilot interview involving three BTLED students from another higher education institution was conducted to refine the interview questions; these participants were excluded from the actual study. Following the approval of the university and the appropriate ethics review committee, participants were informed about the study's objectives, voluntary nature of participation, confidentiality of responses, and their right to withdraw at any stage without penalty. Written informed consent was secured before conducting individual face-to-face interviews lasting approximately 45 to 60 minutes, which were audio-recorded with participants'

permission. Field notes were likewise maintained to document participants' non-verbal expressions, emotional reactions, and contextual observations that complemented the interview data. All interviews were transcribed verbatim, after which participants reviewed their transcripts through member checking to verify the accuracy of their responses. Data analysis followed Colaizzi's (1978) Seven-Step Phenomenological Method, involving repeated reading of transcripts, extraction of significant statements, formulation of meanings, clustering of themes, development of exhaustive descriptions, identification of the fundamental structure of the phenomenon, and validation of the findings by participants. To facilitate systematic coding and thematic organization, NVivo qualitative data analysis software was utilized throughout the analytical process. The trustworthiness of the study was established using the criteria proposed by Lincoln and Guba (1985), specifically credibility, transferability, dependability, and confirmability. Credibility was enhanced through prolonged engagement, member checking, peer debriefing, and triangulation using interview transcripts and field notes. Transferability was ensured by providing rich and detailed descriptions of the research context and participants, allowing readers to determine the applicability of the findings to similar settings. Dependability was maintained through a comprehensive audit trail documenting every stage of the research process, while confirmability was

achieved through reflexive journaling, bracketing, and maintaining an objective record of analytical decisions. Ethical principles of respect for persons, beneficence, non-maleficence, justice, confidentiality, anonymity, and privacy were strictly observed throughout the investigation. Pseudonyms were assigned to all participants to protect their identities, and all digital recordings and interview transcripts were securely stored in password-protected files accessible only to the researcher. The study likewise complied with the provisions of the Data Privacy Act of 2012 (Republic Act No. 10173) and internationally accepted ethical standards governing qualitative research, ensuring that all information collected was used solely for academic and research purposes.

Results and Discussion

Theme 1: Developing Environmental Consciousness through Consumer Education

One of the most prominent findings of the study revealed that consumer education served as the foundation for developing environmental consciousness among Bachelor of Technology and Livelihood Education (BTLEd) students. Participants described consumer education as extending beyond understanding consumer rights and financial decision-making; instead, they perceived it as an avenue for cultivating responsible environmental behavior and sustainable living. Through classroom discussions, laboratory activities, and university-led

environmental campaigns, the participants realized that everyday consumer choices significantly influence ecological sustainability. They emphasized that selecting environmentally friendly products, minimizing plastic consumption, practicing waste segregation, conserving natural resources, and supporting sustainable production are practical expressions of responsible consumer behavior. These experiences gradually transformed their perspectives from being ordinary consumers into environmentally responsible individuals who consciously considered the environmental consequences of their decisions.

One participant shared:

"Before taking Consumer Education, I only thought about buying products based on price and quality. Now I always ask myself if the product is environmentally friendly, recyclable, or if it will contribute to waste."
(Participant 4)

Another participant stated:

"Consumer education taught me that every purchase has an environmental impact. I became more conscious of reducing plastic use and choosing reusable materials whenever possible."
(Participant 9)

Similarly, another participant reflected:

"Our classes made me realize that being a responsible consumer also means protecting nature. Small actions like bringing reusable containers and

avoiding single-use plastics can make a difference." (Participant 12)

These narratives demonstrate that consumer education significantly shaped participants' environmental awareness by encouraging them to evaluate consumption decisions from ecological, social, and ethical perspectives. Rather than focusing solely on economic considerations, participants recognized the broader environmental implications of their purchasing behaviors.

The findings support Ajzen's (1991) Theory of Planned Behavior, which posits that attitudes significantly influence behavioral intentions and actual practices. As students developed positive environmental attitudes through consumer education, they became more inclined to practice environmentally responsible behaviors. Likewise, Kolb's Experiential Learning Theory (1984) explains that meaningful learning occurs when knowledge is reinforced through authentic experiences and reflective practice. Classroom discussions combined with practical environmental activities enabled students to internalize sustainability principles and translate them into everyday consumer decisions.

The findings are likewise consistent with UNESCO's (2020) Education for Sustainable Development Roadmap, which emphasizes that sustainability education should cultivate values, attitudes, and competencies that empower learners to become responsible stewards of the environment. Similarly, Kellner et al.

(2026) reported that sustainability-oriented instruction in higher education significantly enhances environmental awareness and encourages students to integrate sustainable practices into their daily lives.

Theme 2: Translating Sustainable Knowledge into Daily Clean and Green Practices

The participants consistently expressed that environmental knowledge gained through consumer education became meaningful only when translated into concrete daily actions. They described numerous clean and green practices they regularly performed both inside and outside the university, including proper waste segregation, recycling, composting biodegradable waste, conserving electricity and water, planting trees, maintaining school gardens, avoiding food waste, and participating in environmental campaigns. These practices reflected the participants' growing commitment to environmental stewardship and sustainable living.

One participant shared:

"Our lessons encouraged me to practice waste segregation not only in school but also at home. My family eventually adopted the same practice." (Participant 2)

Another participant explained:

"I started bringing my own water bottle and reusable utensils because I realized

how much plastic waste I was producing every day." (Participant 8)

Another participant added:

"Participating in campus clean-up drives and tree-planting activities made me realize that protecting the environment requires action, not just knowledge." (Participant 15)

These experiences illustrate that participants actively transformed environmental knowledge into sustainable behaviors through consistent application in their daily routines. Their actions demonstrate the practical integration of consumer education, environmental ethics, and life sciences.

The findings reinforce Kolb's (1984) Experiential Learning Theory, wherein knowledge is strengthened through repeated application and reflection. They also support Education for Sustainable Development, which encourages learners to become active participants in solving environmental problems rather than passive recipients of information (UNESCO, 2020).

Moreover, Damayon et al. (2026) observed that students who actively participate in environmental programs exhibit stronger eco-consciousness and environmental stewardship than those whose learning remains limited to classroom instruction. The participants' narratives affirm that experiential engagement is essential for developing lifelong environmental responsibility.

Theme 3: Overcoming Challenges in Sustaining Environmentally Responsible Practices

Although participants demonstrated strong environmental commitment, they also encountered several challenges that hindered the consistent practice of clean and green behaviors. The most frequently mentioned barriers included limited environmental facilities, inadequate waste management infrastructure, insufficient community participation, financial constraints associated with purchasing environmentally friendly products, and inconsistent environmental practices among peers and family members.

One participant explained:

"Sometimes I want to buy eco-friendly products, but they are more expensive than regular products, so I cannot always afford them." (Participant 6)

Another participant shared:

"It is difficult to maintain proper waste segregation when some people still mix biodegradable and non-biodegradable wastes." (Participant 10)

Similarly, another participant remarked:

"Environmental practices become difficult when other people do not cooperate. Sometimes your efforts feel insignificant." (Participant 13)

These narratives indicate that environmental stewardship is influenced not only by individual attitudes but also by institutional support, economic realities,

and social contexts. Participants acknowledged that sustainable behaviors require collective participation and supportive environmental systems.

These findings align with **Ajzen's (1991) Theory of Planned Behavior**, which emphasizes that perceived behavioral control influences individuals' ability to perform desired behaviors. Even when students possess positive environmental attitudes, structural and social barriers may limit their capacity to consistently engage in environmentally responsible actions.

Similarly, previous studies have reported that institutional infrastructure, accessibility of sustainable products, and community participation significantly influence environmental behavior among university students (Damayon et al., 2026; UNESCO, 2020).

Theme 4: Strengthening Environmental Stewardship through Community Participation

Participants consistently emphasized that environmental stewardship became more meaningful through collaborative community engagement. University extension activities, clean-up drives, tree-planting initiatives, environmental seminars, recycling campaigns, and community education programs strengthened their sense of environmental responsibility while allowing them to share sustainable practices with others.

One participant narrated:

"Joining community clean-up activities taught me that environmental protection is everyone's responsibility, not just the government's." (*Participant 5*)

Another participant stated:

"When we conducted environmental awareness campaigns in nearby communities, I realized that teaching others also strengthened my own commitment." (*Participant 11*)

A third participant reflected:

"Community activities helped me appreciate that small environmental actions become bigger when everyone participates." (*Participant 1*)

These findings suggest that collaborative environmental activities cultivate civic responsibility, leadership, and social accountability. Participants viewed community engagement as an extension of classroom learning that strengthened both environmental competencies and interpersonal relationships.

The findings support the principles of Education for Sustainable Development, which encourage collaborative learning, community engagement, and participatory approaches in addressing sustainability issues (UNESCO, 2020). Likewise, Angco (2026) emphasized that university extension programs provide authentic learning experiences that strengthen environmental stewardship while promoting sustainable community development.

Theme 5: Envisioning Future Roles as Environmentally Responsible Educators

Perhaps the most transformative finding of the study was the participants' recognition of their future professional responsibility as educators who will promote environmental sustainability among future generations. Participants viewed themselves not only as consumers but also as future teachers capable of influencing students' environmental attitudes, values, and behaviors through classroom instruction and community involvement.

One participant shared:

"As a future TLE teacher, I want my students to understand that consumer education includes caring for the environment." (*Participant 3*)

Another participant explained:

"I hope to integrate clean and green activities into my future classes because children learn better when they experience environmental practices themselves." (*Participant 14*)

Another participant concluded:

"Environmental stewardship should become part of every lesson because education can change people's behavior toward protecting nature." (*Participant 7*)

These narratives reveal that participants internalized environmental stewardship as an integral component of their professional identity. Their experiences

extended beyond personal environmental responsibility toward becoming future advocates of sustainable development.

The findings reinforce UNESCO's (2020) assertion that teachers are critical agents in achieving sustainable development because they influence future generations' environmental knowledge, attitudes, and behaviors. Similarly, Kolb's Experiential Learning Theory explains that transformative experiences contribute to professional identity formation by integrating knowledge, reflection, and future application.

Summary of Findings

These themes reveal a transformative journey from acquiring consumer knowledge to becoming environmentally responsible individuals and future educators committed to advancing sustainable life sciences. The findings further demonstrate that consumer education serves as a catalyst for environmental stewardship by shaping responsible consumption, sustainable behaviors, community engagement, and professional commitment to environmental sustainability. Collectively, the participants' lived experiences provide empirical support for integrating consumer education, clean and green practices, and sustainability principles within Technology and Livelihood Education curricula to prepare future educators capable of promoting environmental responsibility and contributing to the achievement of sustainable development goals.

Discussion

The findings of this phenomenological study demonstrate that consumer education significantly influences the environmental consciousness, sustainable behaviors, and professional identity of Bachelor of Technology and Livelihood Education (BTLED) students at Don Mariano Marcos Memorial State University. The participants' lived experiences revealed that consumer education extends beyond developing competencies in financial literacy, consumer rights, and informed purchasing decisions. Rather, it serves as a transformative educational process that cultivates environmental responsibility, ethical consumption, ecological awareness, and sustainable decision-making. Through classroom instruction, experiential learning, and participation in university-led environmental initiatives, the participants gradually developed an appreciation of how individual consumer choices directly affect environmental sustainability and the conservation of natural resources. These findings support the premise of Education for Sustainable Development (ESD), which emphasizes that higher education institutions should empower learners to become active contributors to sustainable societies by integrating environmental values, knowledge, and competencies into teaching and learning (UNESCO, 2020).

The participants likewise demonstrated that meaningful learning occurred when theoretical knowledge was translated into

practical environmental actions. Their involvement in waste segregation, recycling, tree planting, water and energy conservation, sustainable purchasing, and environmental advocacy illustrates the importance of experiential learning in fostering long-term behavioral change. These experiences corroborate Kolb's (1984) Experiential Learning Theory, which argues that learning becomes meaningful through direct experience, reflection, conceptualization, and application. The findings further reinforce Ajzen's (1991) Theory of Planned Behavior by illustrating that positive environmental attitudes developed through consumer education strengthened students' intentions and commitment to engage in environmentally responsible practices. However, participants also acknowledged that maintaining sustainable behaviors remains challenging because of inadequate environmental infrastructure, financial limitations, inconsistent institutional practices, and varying levels of community participation. These findings suggest that environmental stewardship is influenced not only by individual motivation but also by supportive institutional policies, accessible resources, and collective community engagement. Consequently, environmental sustainability should be viewed as a shared responsibility among educational institutions, government agencies, communities, and individual citizens.

An equally significant finding was the participants' recognition of their future roles as educators who will influence succeeding generations in adopting sustainable lifestyles. As future Technology and Livelihood Education teachers, they perceived environmental stewardship as an integral component of their professional responsibilities. They expressed intentions to integrate consumer education, environmental ethics, and sustainability concepts into their future classrooms through experiential and community-based learning activities. This finding highlights the transformative role of teacher education institutions in producing environmentally responsible educators who can serve as catalysts for sustainable development. Collectively, the findings suggest that integrating consumer education with clean and green environmental practices not only enhances students' environmental literacy but also strengthens their commitment to lifelong environmental stewardship, thereby contributing to the achievement of Sustainable Development Goals related to responsible consumption, climate action, quality education, and life on land.

Recommendations

Based on the findings and conclusions of this study, the following recommendations are proposed:

Higher education institutions, particularly teacher education institutions, should strengthen the integration of environmental sustainability across

academic programs by embedding consumer education, environmental stewardship, and sustainable life sciences into classroom instruction, research, extension, and student development initiatives. Universities should institutionalize sustainability-oriented policies that encourage active student participation in clean and green environmental programs, thereby fostering environmentally responsible graduates who can contribute to sustainable development.

The College of Teacher Education of Don Mariano Marcos Memorial State University should enrich the Bachelor of Technology and Livelihood Education curriculum by incorporating experiential learning strategies that promote responsible consumer behavior and environmental stewardship. Faculty members should utilize project-based learning, service-learning, community immersion, environmental campaigns, and interdisciplinary activities that allow students to translate sustainability concepts into authentic environmental practices.

Faculty members teaching Consumer Education and other Technology and Livelihood Education courses are encouraged to integrate sustainability competencies into instructional planning and assessment. Learning experiences should emphasize responsible consumption, waste minimization, resource conservation, circular economy principles, environmental ethics, climate

change adaptation, biodiversity conservation, and ecological responsibility. Likewise, instructors should continuously engage students in reflective learning activities that encourage critical thinking and environmental decision-making.

University administrators should strengthen campus sustainability initiatives by improving environmental infrastructure, including waste segregation facilities, recycling centers, composting areas, rainwater harvesting systems, energy-efficient technologies, and campus greening projects. Institutional support for environmental organizations, student-led sustainability projects, and community partnerships should likewise be enhanced to provide meaningful opportunities for experiential learning and environmental leadership.

Local government units, environmental organizations, and community stakeholders should establish stronger collaborations with higher education institutions to implement community-based environmental education programs, ecological conservation projects, and sustainability campaigns. Such partnerships will provide students with authentic opportunities to apply their knowledge while addressing real environmental issues within local communities.

Educational policymakers may utilize the findings of this study in strengthening the implementation of the National Environmental Awareness and Education

Act of 2008 (Republic Act No. 9512), the Ecological Solid Waste Management Act of 2000 (Republic Act No. 9003), and the Commission on Higher Education's sustainability initiatives. Policies promoting Education for Sustainable Development should encourage higher education institutions to integrate environmental stewardship into teacher education curricula and institutional development plans.

Future researchers are encouraged to replicate this study using larger participant groups and different higher education institutions to validate the transferability of the findings. Comparative studies involving private and public universities, mixed-methods investigations, longitudinal research, and intervention studies examining the effectiveness of environmental education programs are likewise recommended. Researchers may also explore the relationships among consumer education, environmental literacy, climate resilience, circular economy practices, green entrepreneurship, and sustainable lifestyles among pre-service teachers and other academic disciplines.

Contribution of the Study

The study contributes to the growing body of knowledge in Consumer Education, Environmental Education, Technology and Livelihood Education, and Sustainable Life Sciences by providing an in-depth understanding of how future educators develop environmental stewardship through their lived experiences. Unlike

previous quantitative investigations that primarily measured environmental awareness or attitudes, this phenomenological inquiry revealed the meanings, motivations, challenges, and transformative experiences underlying students' environmental behaviors. The study demonstrates that consumer education functions not merely as a subject concerned with purchasing decisions but as a catalyst for developing ecological responsibility, sustainable consumption, and environmental leadership.

Furthermore, the proposed Environmental Stewardship Integration Framework (ESIF) offers a practical guide for integrating sustainability into teacher education curricula. The framework may assist higher education institutions in enhancing instructional practices, strengthening campus sustainability initiatives, promoting community engagement, and producing graduates capable of advancing the United Nations Sustainable Development Goals through education.

Limitations of the Study

Although the study generated rich qualitative insights, several limitations should be acknowledged. First, the study involved only fifteen Bachelor of Technology and Livelihood Education students from Don Mariano Marcos Memorial State University; therefore, the findings are context-specific and are not intended for statistical generalization. Second, the investigation relied primarily

on participants' self-reported experiences, which may have been influenced by recall bias or social desirability. Third, the study employed a phenomenological approach that focused on understanding the essence of participants' lived experiences rather than measuring the effectiveness of environmental programs. Future investigations employing mixed-methods, experimental, or longitudinal research designs may provide broader empirical evidence concerning the influence of consumer education on environmental stewardship and sustainable life sciences.

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211.
- Angco, R. J. N. (2026). Bridging academia and communities through higher education extension programs in the Philippines: A meta-synthesis toward theory generation. *Frontiers in Education*.
- Brundiers, K., Barth, M., Cebrián, G., Cohen, M., Diaz, L., Doucette-Remington, S., Dripps, W., Habron, G., Harré, N., Jarchow, M., Losch, K., Michel, J., Mochizuki, Y., Rieckmann, M., Parnell, R., Walker, P., & Zint, M. (2021). Key competencies in sustainability in higher education. *Sustainability Science*, 16(1), 13–29.
- Colaizzi, P. F. (1978). Psychological research as the phenomenologist views it.

In R. Valle & M. King (Eds.), *Existential-Phenomenological Alternatives for Psychology* (pp. 48–71). Oxford University Press.

Creswell, J. W., & Poth, C. N. (2018). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches* (4th ed.). SAGE Publications.

Damayon, S. B., Mania, E. E. N., Aquino, N. A. P., & Padilla, R. M. R. (2026). Environmental education and student eco-consciousness predictors: Implications for sustainable development in higher education. *International Journal of Latest Technology in Engineering, Management & Applied Science*, 15(2), 155–172.

Galang, A. P. (2010). Environmental education for sustainability in higher education institutions in the Philippines. *International Journal of Sustainability in Higher Education*, 11(2), 173–183.

Giorgi, A. (2009). *The Descriptive Phenomenological Method in Psychology: A Modified Husserlian Approach*. Duquesne University Press.

Husserl, E. (1970). *The Crisis of European Sciences and Transcendental Phenomenology* (D. Carr, Trans.). Northwestern University Press. (Original work published 1936)

Kellner, P., Ngo, C.-L., Bedi, G., Garivaldis, F., Tsering, D., Delafosse, V., & Bos, J. J. (2026). Emerging themes in sustainability education in higher education institutions: A scoping review of reviews. *Environmental Education Research*.

Kolb, D. A. (1984). *Experiential Learning: Experience as the Source of Learning and Development*. Prentice Hall.

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice Hall.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic Inquiry*. SAGE Publications.

Lozano, R., Barreiro-Gen, M., Lozano, F. J., & Sammalisto, K. (2023). Achieving the Sustainable Development Goals in higher education institutions: A systematic review. *Journal of Cleaner Production*, 387, 135806.

Moustakas, C. (1994). *Phenomenological Research Methods*. SAGE Publications.

Patton, M. Q. (2015). *Qualitative Research & Evaluation Methods* (4th ed.). SAGE Publications.

Quimat, R. M., & Picardal, M. (2024). Context-based teaching through Education for Sustainable Development in Philippine secondary schools: A meta-analysis. *Recoletos Multidisciplinary Research Journal*.

Republic of the Philippines. (2001). *Republic Act No. 9003*. Ecological Solid Waste Management Act of 2000.

Republic of the Philippines. (2008). *Republic Act No. 9512*. National Environmental Awareness and Education Act of 2008.

Republic of the Philippines. (2012). *Republic Act No. 10173*. Data Privacy Act of 2012.

Rieckmann, M. (2018). Learning to transform the world: Key competencies in Education for Sustainable Development. In A. Leicht, J. Heiss, & W. Byun (Eds.), *Issues and Trends in Education for Sustainable Development* (pp. 39–59). UNESCO.

Sterling, S. (2016). A commentary on Education for Sustainable Development and the SDGs. *Journal of Education for Sustainable Development*, 10(2), 208–213.

UNESCO. (2020). *Education for Sustainable Development: A Roadmap*. UNESCO Publishing.

UNESCO. (2021). *Reimagining Our Futures Together: A New Social Contract for Education*. UNESCO Publishing.

United Nations. (2015). *Transforming Our World: The 2030 Agenda for Sustainable Development*. United Nations.

United Nations. (2015). *Transforming our world: The 2030 Agenda for Sustainable Development*.