



Encouraging Environmental Stewardship Among Business Students: A Design Thinking Exploration

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Abstract

This study addresses a critical gap in business education where traditional methods often fail to translate theoretical knowledge of sustainability into a deep, action-oriented commitment to environmental stewardship. The WEF Report on Jobs of the Future 2025 highlights the urgent need for a workforce equipped with green skills, yet business students frequently lack the practical tools to integrate environmental responsibility into their professional lives. This paper explores the Design Thinking framework as an innovative pedagogical tool to bridge this divide. Employing a qualitative action research design, we engaged a cohort of business students in a hands-on Design Thinking intervention. Data collected through observations, participant feedback, and prototype ideas generated by participants. The findings demonstrate that Design Thinking (DT) is a highly effective methodology for cultivating a tangible sense of stewardship and developing the critical skills demanded by the future economy. This empathy-driven process leads to changes in students' perceptions and attitudes, directly fostering the core competencies needed for green skills. The structured process empowered students to move from passive learning to proactive problem-solving, resulting in the development of creative and actionable prototypes for real-world environmental challenges. This research offers a practical model for business schools seeking to integrate sustainability more meaningfully into their curricula. While the study's scope is limited to a single group, it provides a strong foundation for future research into experiential learning methods that cultivate responsible business leaders.

Keywords: *Environmental Stewardship, Design Thinking, Business Student*

INTRODUCTION

The World Economic Forum's Future of Jobs Report 2025 emphasizes that technological change, geoeconomic fragmentation, economic uncertainty, demographic shifts, and the green transition – individually and in combination are among the major drivers expected to shape and transform the global labour market by 2030. It projects roughly 170 million new jobs by 2030, with about 34 million in green-sector occupations driven by sustainability initiatives ([World Economic Forum, 2025](#)). However, demand for these green jobs is already outpacing the supply of qualified workers: one analysis finds that job postings requiring green skills grew 22% between 2022 and 2023, while the number of workers acquiring those skills grew only 12% ([Darendeli et al., 2022](#)). Reflecting this shift, “environmental stewardship” (ES) has entered the top ten fastest-growing workplace skills worldwide. The concentration of green skills required in job postings could reflect firms' commitment to environmental issues beyond just compliance ([Darendeli et al., 2022](#)). Underlining that expertise in sustainability will be essential for future professionals across industries.

Environmental stewardship (ES) itself denotes a broad ethic and set of actions to protect and restore natural resources. Environmental stewardship (ES) is a term describing both the philosophy and the actions required to protect, restore, and sustainably use natural resources for the future benefit of the environment and society ([McLeod et al., 2024](#)). Environmental stewardship

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(ES) is one way through which people get involved in promoting sustainability (Bennett et al. 2018). In practice, stewardship involves multiple dimensions: the context (social, economic, and biophysical setting), the actors (who participate and their roles), the actions (protecting, restoring, or sustainably using the environment), and the outcomes (ecological and societal benefits) (McLeod et al., 2024). These facets make clear why business leaders and students must internalize stewardship principles. An understanding of environmental stewardship (ES) is crucial. This concept is no longer just a topic for activists; it is a key element in modern business strategy. Business ventures must balance economic development with conservation (Söderholm, 2020). Embedding stewardship into business education would teach students to consider environmental contexts and stakeholder roles when creating innovative business models.

The shift towards a green economy is not solely driven by market forces or individual corporate decisions. It is also a direct response to evolving national and international governance structures and policy frameworks that mandate or incentivize sustainable practices (Mensah, 2019). For instance, global agreements like the Paris Agreement and national regulations on carbon emissions and waste management compel businesses to adopt more responsible operational models. Therefore, the successful integration of environmental stewardship (ES) into business education must also prepare students to navigate and influence these policy environments. This requires an understanding of how governance mechanisms, from corporate policies to governmental regulations, shape business behavior and create a framework for long-term sustainability (Portus et al., 2024).

Despite the urgency, current business curricula often fail to impart sufficient sustainability skills. Industry data warn that business and other programs must invest heavily in "green education" to close the widening skills gap. In fact, Wamsler (2023) has claimed that by 2025 demand for sustainability competencies could outstrip supply by over 100%, emphasizing "the need to invest in sustainability education, including in business education". They found that it demonstrates how sustainability leadership and education can become a vehicle for transformation if certain principles are in place. These critiques illustrate that traditional business programs tend to emphasize shareholder profit over societal and environmental purpose, leaving graduates underprepared for the green economy. There is a need to embed a focus on long-term value creation, beyond short-term profit, by teaching students how to measure and report on the environmental, social, and governance impacts of business operations (Lim, 2024).

To address this educational shortfall, many scholars advocate using Design Thinking (DT) as a pedagogy for sustainability in business education. Design Thinking (DT) encourages integrative, creative problem solving: it trains students to reframe complex challenges from multiple perspectives and to ideate innovative solutions (Quintanilla et al, 2022). This method enables students to develop empathy for environmental issues and explore creative, innovative, and applicable ideas. This method focuses not only on the final product but also on the creative and collaborative process (Foster, 2019).

This paper explores the Design Thinking (DT) framework as an innovative pedagogical tool to bridge a critical gap in business education where traditional methods often fail to translate theoretical knowledge of sustainability into a deep, action-oriented commitment to environmental stewardship (ES). To address the gaps identified above, this study aims to answer the following research questions: "How can the Design Thinking (DT) framework be integrated into business education to foster students' understanding and commitment to environmental stewardship (ES)?" This study focuses on a specific institutional setting to provide a practical and context-rich analysis. The research was conducted at a leading state university in Surabaya, Indonesia. By examining how Design Thinking (DT) is applied within a specific business curriculum in this region, this paper aims to provide actionable insights that are relevant to similar educational institutions in developing

economies.

In addition, this study also aims to analyze how Design Thinking (DT) can encourage active student participation in developing business ideas that are oriented towards environmental sustainability. By engaging learners in hands-on projects and cross-functional teams, Design Thinking (DT) pedagogy can deepen understanding of sustainability issues. Involving students in the early “problem identification” and “ideation” stages of real-world sustainability cases helps them learn to “think and act sustainably”, mitigating the traditional disconnect between business school and practical challenges. This research offers a practical model for business schools seeking to integrate sustainability more meaningfully into their curricula. Design Thinking (DT) is one of the robust and flexible tools to foster business students' skills amidst current fierce competition and global challenges.

LITERATURE REVIEW

Environmental stewardship (ES), understood as the ethical responsibility to protect and restore ecosystems through active participation and sustainable practice, provides the philosophical and practical foundation for green education (Bennett et al., 2018). Green skills, broadly defined, encompass not only technical competencies (Shaban et al., 2024), such as emissions monitoring and resource-efficient processes, but also cognitive, interpersonal, and intrapersonal capacities, including innovation, adaptability, coordination, and environmental awareness. These multidimensional skills are essential for individuals to contribute effectively to sustainability transitions, highlighting the inseparable relationship between green skills and stewardship ethos (Brundiers et al., 2020).

As institutions forming tomorrow's leaders, business schools must embed the Sustainable Development Goals (SDGs), particularly SDG 4.7 on education for sustainable development, across curricula to cultivate sustainability literacies (Gupta et al., 2017). However, criticism persists: traditional programs often marginalize environmental and social priorities in favor of conventional profit-driven models, leading to superficial integration of sustainability (Springett et al., 2001). On the other hand, progressive schools, especially in Europe, are experimenting with immersive and experiential pedagogies that combine sustainability with collaborative and technological innovation (Çelik et al., 2024). These examples suggest emerging shifts, though a systemic, global transformation in business education remains incomplete.

Design thinking (DT) is a human-centered, iterative methodology centered on empathy, problem reframing, prototyping, and multidisciplinary collaboration (Auernhammer et al., 2021). Recent research underscores its potent alignment with sustainable development education, noting DT's utility in addressing “wicked” sustainability problems through creativity, stakeholder engagement, and value-driven learning (Bickley et al., 2024). By its creative and intuitive nature, design thinking can be distinguished from other processes, which are purely analytical (Mansoori et al., 2020). In business education, DT's focus on user-centered innovation and iterative testing enables students to ideate sustainable business models responsive to ecological and social contexts, thereby operationalizing both green skills and stewardship values (Manchanda et al., 2025).

Taken together, these streams, stewardship and green skills, SDG-anchored business education, and Design Thinking (DT) pedagogy, form an integrative conceptual foundation: green skills rooted in stewardship ethos are advanced through innovative, SDG-aligned business education, and activated via Design Thinking (DT) methodologies. In the context of mangrove ecotourism at Gunung Anyar, Surabaya, such a framework enables business students to collaboratively co-design ventures that respect ecological integrity, drive local livelihoods, and embody stewardship principles. Also, this specific attitude needs a paradigm shift in how sustainability is taught, advocating for a more experiential, holistic, and interdisciplinary approach

that evokes a structure of compliance in business education to provide the education model for the most anticipated future leader. This chapter thus sets the stage for a conceptual framework in which Design Thinking (DT) mediates between educational structures and real-world sustainability challenges, preparing students as green leaders who can navigate complex ecological and societal dynamics (Earle et al., 2020).

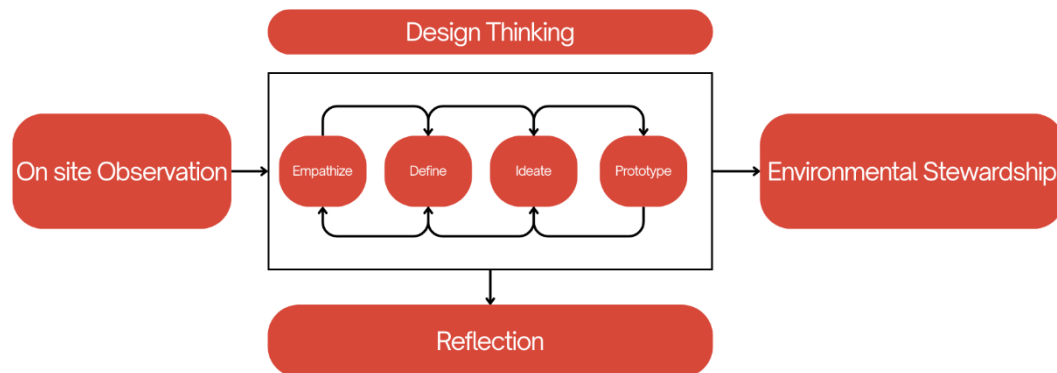


Figure 1. Conceptual Framework of the research

RESEARCH METHOD

A qualitative research design was used in this study. This study sought to explore the use of the Design Thinking (DT) framework as an innovative pedagogical tool to bridge critical gaps in business education. This approach allowed for a more in-depth exploration of the topic of *Environmental Stewardship (ES)*. The Design Thinking (DT) framework used in this study consists of *Empathize*, *Define*, *Ideate*, and *Prototype*. *Testing* was not used in this study because the research objective only reached the stage where participants could go through a structured process to transition from passive learning to proactive problem solving, resulting in the development of creative prototypes. Therefore, feedback collection from users was not yet required.

The study's intervention was conducted over one day, involving a structured application of the Design Thinking (DT) framework at the Gunung Anyar mangrove ecotourism site. The procedural steps were as follows:

1. Preparation; Participants were briefed on the study's purpose and the DT framework. They were given a brief introduction to the environmental challenges at the mangrove site by a researcher.
2. Empathize; Participants engaged in direct observation. They documented their observations in personal notebooks and through photographs. The objective was to understand the problems, needs, and aspirations of various stakeholders.
3. Define: Participants gathered in small groups to synthesize the data from the Empathize phase. They used tools like empathy maps and persona creation to identify and define a core problem statement related to the mangrove ecosystem's sustainability.
4. Ideate: Using the defined problem statements, groups brainstormed a wide range of potential solutions. Techniques such as 'How Might We' questions and mind-mapping were used to encourage creative and innovative thinking.
5. Prototype: Each group selected its most promising idea and developed a low-fidelity prototype. This could be a physical model, a storyboard, or a role-play. The goal was not a final product but a tangible representation of their idea to be shared with others. The Testing stage was deliberately excluded, as the study's objective was to assess the impact of the DT process on skill development, not the viability of the final ideas."

Participants

This research was conducted in May 2025. Ten business students were used as participants in this study. The participants consisted of six women and four men. The ten participants were selected using a purposive sampling strategy. This non-probability sampling method was chosen to intentionally select individuals who possess specific characteristics relevant to the research topic. The criteria for selection were: being an active business student at Universitas Pembangunan Nasional "Veteran" Jawa Timur and having no prior formal training in environmental sustainability or Design Thinking. This approach ensured that the study could capture the learning process of participants who were new to the concepts, thereby providing a clear view of the intervention's impact. A sample size of ten was deemed appropriate for this qualitative study, as it is sufficient to achieve data saturation, where no new themes or insights are emerging from the data, while still allowing for a deep, in-depth analysis of each participant's experience. All participants were directly involved in four Design Thinking (DT) frameworks at the Gunung Anyar mangrove ecotourism site in Surabaya. This location was chosen because mangrove conservation faces environmental sustainability challenges, which would serve as a source of inspiration for the participants.

Data Gathering and Research Instruments

Data collection was conducted using triangulation techniques to ensure the validity and reliability of the findings in this study. The instruments used in this study were two researchers. The researcher was directly involved throughout the research process, from the Empathize stage to the Prototype stage. Data was systematically collected using three distinct methods to ensure a comprehensive understanding of the participants' experiences.

1. Structured observations: A detailed observation protocol was used to guide the field notes. The protocol focused on key behavioral indicators, such as collaboration within groups, participation levels, and the types of questions asked during each DT stage. This structured approach ensured that the observations were consistent and directly relevant to the research questions.
2. Participants' feedback (semi-structured interviews); Feedback was gathered through brief, semi-structured interviews conducted at the end of each DT stage. A pre-defined list of open-ended questions was used. This method provided a rich, narrative account of participants' thoughts and feelings.
3. Prototype artifact assessment: The prototypes were assessed using a content analysis matrix. The matrix was designed to evaluate two key aspects: (a) the creativity and innovation of the idea, and (b) the integration of sustainability aspects as demonstrated in the prototype's design and the participants' verbal explanation.

The trustworthiness of this qualitative study was ensured through the use of data triangulation and additional measures. We employed methodological triangulation, combining data from observations, semi-structured interviews, and artifact analysis. The convergence of findings from these three sources provided a more robust and holistic understanding of the phenomenon. Additionally, we utilized peer debriefing, where both researchers regularly discussed and challenged each other's interpretations of the data. This process helped mitigate researcher bias and ensured a more objective analysis. An audit trail was also maintained, including all raw data, field notes, and analysis memos, to provide a clear and transparent record of the research process, allowing for external scrutiny of the findings.

Data Analysis

The analysis was conducted on the data as a whole and continuously, from the initial data collection to the end of the study. The Interactive Model of [Miles et al. \(2013\)](#) was used as the data analysis model in this study. It consists of four stages, i.e., data collection, data display, data condensation, and conclusion.

Data reduction was carried out to identify, clarify, and select key data obtained during the research. The data was then analyzed using thematic analysis to classify the data obtained. The analysis process was followed by clarification between researchers to ensure the validity of the findings. This process is carried out to identify themes that emerge during the Design Thinking (DT) process and link them to the prototypes that have been produced. Data presentation and condensation are done by organizing the data into narratives, tables, or charts to facilitate understanding. Additionally, the conclusions focus on interpreting the findings based on the patterns and themes that emerge from the data generated.

FINDINGS AND DISCUSSION

Design thinking processes

Aforementioned, there are ten participants involved in the research, consisting of six participants are women and four men. Indeed, in every step of design thinking (DT), all participants have insightful contributions based on their observations and experiences strolling around the mangrove ecotourism. It made the findings more diverse than expected.

Empathize

As the initial phase of the Design Thinking (DT) process, the Empathize stage was strategically employed to gain a holistic understanding of the visitor experience at the Gunung Anyar Mangrove Ecotourism site. The goal was to move beyond surface-level observations and uncover the latent needs, challenges, and perceptions of the ecotourism stakeholders ([Brown, 2009](#)). Through a guided observational activity and reflective interviews, participants were prompted to articulate their journey, key discoveries, and moments of note. This activity was structured around three key questions: their activities on-site, their findings, and their highlights.

The qualitative data revealed two distinct thematic insights that underscore the visitor experience. First, participants demonstrated a strong focus on environmental engagement and appreciation. Many highlighted the site's natural diversity, reflecting an initial motivation to connect with the ecotourism aspect. For instance, a participant noted:

"Seeing the diversity of mangrove trees, the animals' living surroundings..." (F1-ZH).

This was echoed by another's reflection on:

"Observing mangrove diversity and its fauna beyond" (M4-FA),

This points to an active desire for ecological learning.

Second, the data highlighted a series of unresolved challenges and experiential inconsistencies along the visitor journey. While the site was perceived as a "completed tourism site" due to its amenities like gift shops, canteens, and well-maintained pathways, this perception was often juxtaposed with moments of friction. A critical insight was shared by a participant who questioned the presence of e-motorcycles on a track path that was posted as being prohibited for such vehicles (F6-JO). This specific observation is not merely a detail; it represents a significant gap

between the site's stated environmental policy and its on-site visitor management. Such conflicts present a critical area for intervention and underscore a core design challenge for ensuring the site's sustainable development and a consistent visitor experience.

Define

Following the extensive data collection in the Empathize phase, the Define stage was used to synthesize these diverse observations into a clear, compelling, and user-centric problem statement. This step is critical in the Design Thinking (DT) process as it distills broad insights into a focused challenge that is actionable and worthy of a design solution (Garrette et al., 2018). Participants were tasked with identifying a specific problem they found most pressing, explaining their rationale, and proposing a solution. The analysis of their responses revealed two primary problem statements.

The first, and most prevalent, concern centered on visitor safety and accessibility. A significant number of participants reported issues with the tracking pathways, citing impropriety in some spots (F4-DR; M4-FA; F1-ZH; F2-VA). This was not a minor inconvenience; participants linked the damaged wooden paths directly to personal safety and the overall enjoyment of the experience. As one participant noted:

"If the wooden path is damaged, it will be dangerous for visitors" (F1-ZH).

This core insight establishes a fundamental Point-of-View (PoV) that tourists at the mangrove ecotourism site need a safe, secure, and well-maintained walking experience because the current damaged and unsigned pathways pose a risk to their well-being and may deter repeat visits. This finding highlights the critical link between infrastructure quality and visitor satisfaction, a key tenet of sustainable tourism management.

A second, equally important problem statement emerged concerning environmental integrity and waste management. Participants who focused on this issue, such as M1-UN and M3-FT, argued that the presence of unseparated waste bins contradicted the very mission of an ecotourism site. Their rationale was rooted in a foundational understanding of Environmental Stewardship (ES), emphasizing that proper waste separation is essential for effective recycling and aligns with a better environmental ethos. This insight provides a second, powerful PoV that the management of the mangrove ecotourism site needs a more effective waste management system that aligns with environmental principles because the current unseparated waste bins undermine the site's ecological mission and visitor expectations.

By the conclusion of this step, the diverse observations from the Empathize phase were successfully narrowed into two distinct, pressing, and actionable problem statements. This synthesis not only provided a clear focus for the subsequent Ideate phase but also demonstrated how the participants, through their mindful observations, were able to identify problems that have direct implications for both the business sustainability of the site (visitor numbers, revenue for SMEs) and its core environmental purpose.

Ideate

To address challenges in ecotourism, an ideation phase was implemented, drawing on the collective efforts of three separate groups. These groups were structured to include a cohort of three female participants (F1-ZH, F2-VA, F4-DR), a cohort of three male participants (M1-UN, M2-ER, M3-FT), and a mixed-gender group comprising one male (M4-FA) and three female participants (F3-SF, F5-EA, F6-JO). This organizational structure yielded three distinct proposals.

The first group's proposal centered on the long-term preservation of mangrove ecosystems. Their concept integrates visitor experience by engaging them in planting mangrove trees, thereby fostering a personal connection to Environmental Stewardship (ES). Simultaneously, the second group focused on a practical solution for waste management, advocating for the strategic placement of trash bins to increase their visibility and facilitate the separation of waste into organic and non-organic categories. The third group addressed the need for enhanced accessibility by proposing the design of user-friendly tracking pathways with clear signage, specifically to assist elderly individuals and visitors with disabilities. The ideas proposed by all participants reflect a shared enthusiasm for cultivating practical and impactful solutions.

Prototype

As the final stage of the Design Thinking (DT) process, the prototyping phase served to transform the participants' intangible ideas into explicit, tangible artifacts. This exercise is not about creating a final product but about building a testable, low-fidelity model that allows for rapid learning and feedback (Brown, 2009). Participants were provided with a variety of materials, including plasticine, Lego, and drawing tools, to explore the most suitable medium for their concepts. The choice of tool ultimately reflected the nature of the solutions being proposed, leading to two distinct types of prototypes.

The first group, whose ideas centered on a conceptual system, opted to use whiteboard markers and paper to create a process prototype. Their doodle-based approach allowed them to visualize the end-to-end user journey of their proposed service, illustrating business processes and key interaction points. This method of prototyping demonstrated an understanding that their solution was not a physical product but a service-based system requiring a clear, logical flow.

In contrast, the second and third groups focused on tangible infrastructure. The second group utilized plasticine and Lego to create a physical model of a new waste bin. This product prototype directly addressed the problem statement concerning waste management and Environmental Stewardship (ES), providing a clear visual representation of their ideas for improved waste separation. The final group, responding to the problem of unsafe tracking pathways, also employed Lego to build a spatial prototype. This model allowed them to explore how to make the pathways more accessible and comfortable, demonstrating a concrete solution to the physical challenges observed in the Empathize phase.

Collectively, these artifacts served as powerful communication tools. They moved the discussion from abstract proposals to concrete, testable concepts that could be shared and critiqued. The act of physically building these solutions not only fostered creativity but also deepened the participants' understanding of the problems they were trying to solve, paving the way for more informed and innovative future implementations (McCrickard et al., 2010).

This study utilized the design thinking (DT) framework to explore how business students engage with and address environmental issues, using a local ecotourism site as a case study. The findings demonstrate that DT is a powerful pedagogical tool that can foster Environmental Stewardship (ES) by transforming abstract concepts into tangible, actionable solutions. The discussion is structured around four key areas, linking the study's findings to existing academic literature.

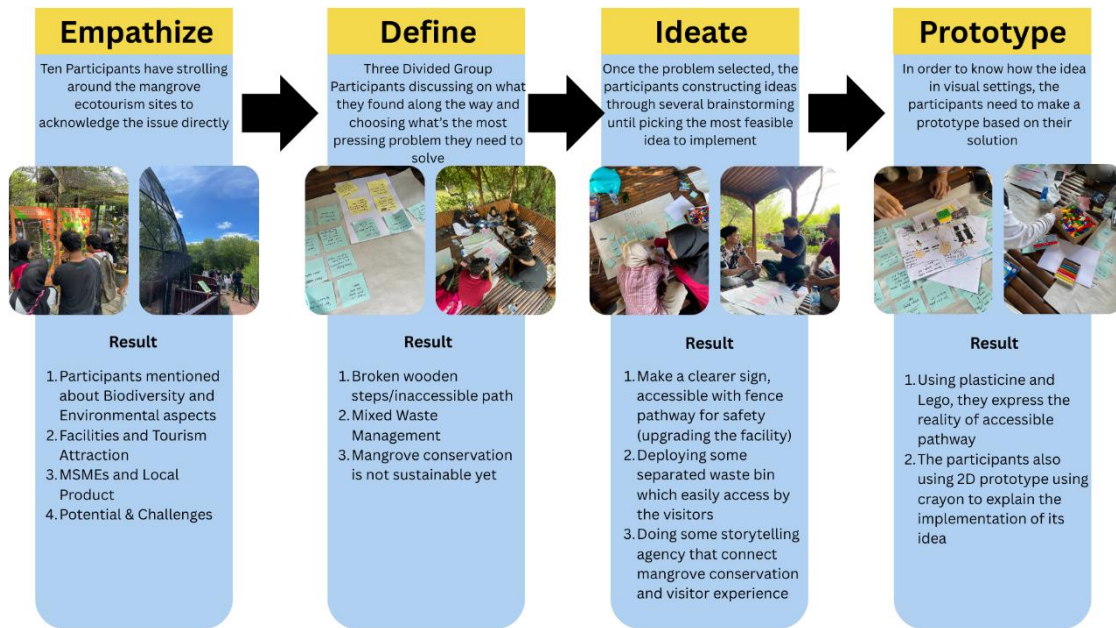


Figure 2. Collective Explanation of Design Thinking (DT) per stage

The correlation between design thinking (DT) and environmental stewardship (ES)

The process of Design Thinking (DT) proved to be a powerful vehicle for fostering Environmental Stewardship (ES). Rather than approaching the topic as a theoretical or distant issue, participants were forced to engage with it directly. The Empathize phase, for example, encouraged a form of eco-centric empathy. Participants moved beyond a simple tourist's perspective to observe the site's biodiversity, commenting on "the diversity of mangrove trees" and "its fauna beyond." This shows a shift from a human-centric view to a more holistic understanding of the ecosystem as a stakeholder.

This hands-on engagement directly addresses a key challenge in sustainability education, where learning often remains theoretical and fails to translate into action (Ricky et al., 2010). The subsequent Define and Prototype phases turned these observations into concrete acts of stewardship. By focusing on specific problems like mixed waste bins and conservation, and then creating tangible models, participants moved from understanding the problem to designing solutions. This aligns with the literature on project-based learning, which suggests that interactive, problem-based approaches are highly effective in engaging students in environmental sustainability (Gan et al., 2024).

Environmental stewardship (ES) and business students

The findings also provide insight into how business students, in particular, can be effectively engaged in ES. Traditionally, business education often treats sustainability as a secondary concern, separate from core functions like profit and strategy (Dey et al., 2010). This study demonstrates that the DT framework can bridge this gap by encouraging students to naturally integrate both environmental purpose and business viability into their solutions.

The prototypes created by participants, such as the waste bank model and the doodle-based business process, show that students were actively thinking about how to make their environmental solutions financially sustainable. This finding resonates with the concept of green entrepreneurship, which is a key focus for higher education (Ali et al., 2023). The DT process, with its focus on ideation and prototyping, provided the students with a structured way to practice this

kind of integrated thinking, thereby cultivating a mindset that can address complex issues through the triple bottom line model ([Homer et al., 2024](#)).

Environmental stewardship (ES) and genders

An interesting finding of this study is the apparent difference in problem-solving approaches based on gender, a nuance not often explored in the literature on sustainable business education. The qualitative data suggest a distinction in the locus of concern. The male participants' commentary reflected a greater focus on strategic and long-term activities. For instance, their solutions often involved developing business models like a "waste bank" or focusing on the "long-term" sustainability of mangrove preservation. This perspective views environmental stewardship (ES) through a lens of systemic, large-scale, and profitable interventions.

In contrast, the female participants' insights gravitated toward human-centered and immediate problems, focusing on "helping people and easing the technicalities of visitors." Their defined problems, such as "inaccessible tracking pathway" and "uncategorized waste bin," directly impacted the visitor experience and safety. These approaches are not mutually exclusive but rather complementary. A comprehensive approach to ES requires both the macro-level strategic thinking (seen in the male-oriented solutions) and the micro-level, user-centered design (seen in the female-oriented solutions). This finding highlights the importance of diverse perspectives in teams tackling complex sustainability challenges.

Both thinking styles provide complementary solutions to environmental stewardship (ES) skills needed in times of crises like now. Men with their capacity for a holistic and strategic view have the role to be a strategist and could make a more comprehensive and holistic plan that embeds business and environmental issues. While women are the technical force and interpreter of men's direction in the implementation phase, they are also suitable as guardians of the environment. The critical issue that was raised is how these two skills could be interchangeable between men and women ahead. Especially when this situation happened within the discourse of business school roles in this current, very challenging era, in which adaptability and transferable skills are urgently needed. The influx of women's participation in many business schools globally has made this becoming serious issue for the leaders and management of business schools to prepare all genders equally as Environmental stewards. ([Lämsä et al., 2007](#))

Design thinking & business school

Ultimately, this study posits that Design Thinking (DT) is not just a tool for innovation but a necessary pedagogical vehicle for modern business education. It directly addresses the shortcomings of traditional curricula by offering a hands-on, problem-based approach that makes sustainability tangible and immediate. By immersing students in a real-world setting, DT overcomes the "lackadaisical perception" of climate change and other environmental issues that often exist when they are only taught in a classroom ([Kyambade et al., 2025](#)).

By making Environmental Stewardship (ES) a core part of the creative and problem-solving process, DT effectively integrates it into the business curriculum. It equips business students to become proactive, responsible leaders who can build enterprises that contribute to both economic prosperity and environmental well-being. The success of this exercise supports a call for a paradigm shift in how sustainability is taught, advocating for a more experiential, holistic, and interdisciplinary approach that is well-suited to the demands of the 21st century.

CONCLUSIONS

This study addressed the critical gap in business education by demonstrating that Design Thinking, as explored through our intervention, is a highly effective pedagogical tool for translating

theoretical sustainability knowledge into action-oriented environmental stewardship among business students, directly fulfilling our objective to bridge this divide. By transforming abstract environmental issues into tangible, problem-based challenges, the DT process cultivates a unique form of eco-centric empathy and empowers students to develop proactive-integrated solutions. The findings show that this experiential approach enables future business leaders to connect environmental purpose with business viability, which makes sense of stewardship. Furthermore, the usage of design thinking (DT) that ignited the students' awareness shall be a precious contribution towards sustainable business practices and education.

The business school shall be integrating Design Thinking (DT) into the curriculum of the 21st century in order to prepare students to face the most pressing challenges ahead. The flexibility, spaciousness, and less judgmental results of the design thinking processes could nourish the next ideas. Also, the practical implementation of design thinking (DT) on environmental action, like in mangrove ecotourism, shall improve the governance of its ecotourism to provide reinforcement, risk mitigation, like prototyping visitors' safety, and compliance and sustainability reporting by and for the stakeholders.

LIMITATION & FURTHER RESEARCH

The findings of this qualitative case study, while insightful, are limited in their generalizability. The study's narrow focus on a single ecotourism site and its exclusive use of business administration students as participants means the results may not apply to other contexts or student backgrounds. Furthermore, the research's scope was confined to the initial phases of the Design Thinking (DT) process, omitting the crucial "Test" phase. This prevents the validation of proposed solutions and limits the understanding of the methodology's real-world impact.

To address these limitations, future research should expand on this study by incorporating a more diverse participant pool, including students from disciplines like environmental science and engineering. A longitudinal approach is also recommended to assess the long-term effects of a Design Thinking (DT) intervention on students' professional behaviors and attitudes. Also, unexpected findings on gender discussants shall be on the next investigation. Finally, future investigations should integrate the "Test" phase to validate prototypes with real users, providing a more comprehensive evaluation of the Design Thinking (DT) process and its efficacy in addressing complex environmental challenges.

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