

Applying Design Thinking in Ecotourism Curriculum Design: The Educational Design Ladder

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Abstract

The design thinking approach transforms student's learning process to connect with real-world experience, making connections between knowledge and improving critical thinking and problem-solving capability. Previous research has focused on what design thinking is taught (content) and how it is taught (learning modes and assessment). However, there needs to be an integrative approach in the context of ecotourism education. Therefore, applying Wrigley and Straker's Educational Design Ladder mode, this study develops an Ecotourism Design Thinking Curriculum framework to combine the ecotourism content, teaching/learning mode and assessment.

Keywords

Ecotourism, Design Thinking, Pedagogy, Curriculum Design

1. Introduction

Ecotourism is characterized by the principles of environmental conservation, community empowerment, benefits generation and equitable distribution [1] [2] [3]. Therefore, ecotourism has emerged as a widely accepted approach to conservation and development, especially in developing countries [4]. However, ecotourism exhibits an array of challenges and opportunities associated with environmental degradation, stakeholder conflicts (e.g. power asymmetries, trust and transparency issues, and competition between actors), climate change and technology development. As such, sustainability-related topics in management education have transitioned from a niche to a core component to deal with the "wicked problems" defined "as a class of social system problems which are

ill-formulated, where the information is confusing, where there are many clients and decision-makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing” [5]. The expanded opportunity for sustainability education poses a challenging issue for educators in a fractal-like manner. How can we adapt our teaching and learning approaches to meet the demands of this market opportunity without trivializing these inherently complex, system-level challenges?

Furthermore, the rapid pace of technological advancement and changes in global industries are reshaping the innovation skills and competencies required in the workforce. Traditional education systems, while valuable, may struggle to keep pace with these evolving demands, leading to a gap between the skills graduates possess and those needed by employers [6]. Ecotourism, a form of sustainable tourism that emphasizes responsible travel to natural areas while conserving the environment and improving the well-being of local communities, has gained significant attention in recent years. As the world grapples with pressing environmental challenges and seeks pathways to sustainable development, ecotourism emerges as a promising approach that offers both economic benefits and conservation outcomes.

Traditional teaching methods offer students a cognitive understanding of ecotourism but tend to lack a holistic point of view. These methods often focus on imparting cognitive knowledge, such as facts, theories, and principles, which provide students with a foundational understanding of ecotourism. However, these methods may sometimes fall short in offering a holistic perspective that encompasses the inter-connectedness of social, environmental, economic, and cultural aspects of ecotourism, where the holistic point of view advanced by several experts [5]. Additionally, traditional ecotourism teaching methods emphasize a teaching-centered approach rather than a learner-centered approach. While traditional ecotourism teaching methods may provide a structured framework for delivering content, they may not always effectively promote deep learning, critical thinking, or student engagement [7].

The convergence of these factors poses significant difficulties in ecotourism education. In today’s rapidly changing and complex world, traditional reductionist approaches to management education may no longer suffice [8]. Integrating exploratory skills into the curriculum is essential to equip students with the ability to navigate uncertainty, complexity, and ambiguity in real-world contexts. By integrating exploratory skills, creativity, openness, and reflection into management education, we can empower students to become adaptive, innovative, and socially responsible leaders who are capable of navigating the complexities of the 21st century. This shift in problem-solving approaches is not only relevant for addressing environmental and social challenges but also for driving positive organizational change and sustainable development across diverse industries and sectors.

It’s necessary to require new ways of problem-solving for responding to chal-

lenges instead of the traditional rational-analytical approach in curricula [6] [9]. To prepare students to address the multifaceted challenges to create effective solutions, it is critical to employ new teaching/learning methods that emphasise student-centred approaches, systematic thinking, and interdisciplinary connections [6]. In response, experience learning serves as a useful framework for changing this paradigm. Within the broader theme of experience learning, design thinking enables people to approach wicked problems systematically and iteratively, ultimately leading to more innovative, human-centered, and effective solutions by cycling through these stages of empathy, reframing, prototyping, experimentation, testing, and redesign [8].

In this study, we not only explore how to apply design thinking to ecotourism curriculum specifically but, based on taxonomy, develop an integrative ecotourism curriculum mode combining design thinking with ecotourism curriculum content, teaching/learning modes and assessment of learning outcomes, facilitating design thinking to integrate into ecotourism education. Previous research revealed that design thinking has been widely accepted in various disciplines such as management [10] [11] [12], education [13] [14], computer studies [15], psychology, medicine, nursing, accounting and law. Some research developed an Educational Design Ladder based on thematic analysis for 51 selected master design courses across 28 international universities, revealing what Design Thinking is being taught (content), and how it is being taught (assessment and learning modes). However, lack of research focuses on ecotourism, especially based on taxonomy theory [6]. Thus, this study applies the Educational Design Ladder to develop an ecotourism design thinking programme.

This research examines the importance of ecotourism in sustainable development, the need for comprehensive education and training in ecotourism, and the relevance of design thinking in developing curriculum designs that foster responsible tourism practices and empower future generations of ecotourism practitioners. Then, this paper develops a pedagogy framework in the context of ecotourism education.

2. Design Thinking

Design Thinking is a method of innovation and value creation that has been widely used in various fields such as business, law, primary education, science, and medicine. In the landmark paper “The Anomalous Problem in Design Thinking”, authors explained that despite efforts to find the basis for design thinking in the arts, natural sciences, and social sciences, design remains difficult to reduce to a boring set of processes, but retaining its flexibility. Additionally, design thinking impacts on the transformation of products, services, processes, and even strategies. In product design, this approach initially used is now also being used to bring about cultural change in large organizations. Also design thinking is applied widely in the field of management, which is the best way to innovate. While in the field of design, although design thinking methods

have a long history of academic development and debate, but may be overlooked or taken for granted. In today's business, it is crucial to integrate creativity throughout the decision-making process through the application of design thinking. Some research discuss how design thinking can turn business strategy into reality. They gave examples of how the SAP Design Services team used design thinking and its methodologies to improve the organization's ability to execute the right strategy and further develop methods for identifying and defining its strategic vision.

3. Design Thinking in Education

Universities adapt Design Thinking into education by teaching and supporting multidisciplinary approaches to solving problems. The Educational Design Ladder develop a five-step model used to measure the level of design thinking in high education, based on what is taught (content) and how it is taught (assessment and learning modes) in universities.

The Educational Design Ladder, based on the five themes or stages of Design Thinking, provides a structured framework for the development of Design Thinking course content, teaching/learning strategies, and assessment processes. As students progress through each stage of the ladder, they build upon their knowledge and skills in Design Thinking, ultimately gaining proficiency in applying Design Thinking principles to real-world challenges. In another word, the five steps illustrate the five stages of design maturity:

Step 1: Theories, Methods, and Philosophies. This theme lays the foundation for Design Thinking by introducing students to its theories, methods, and underlying philosophies. Students learn critical analysis and reflection skills, enabling them to develop their own design processes. By understanding the principles of Design Thinking, students gain the ability to approach complex problems with creativity and empathy.

Step 2: Product Focus. In this theme, Design Thinking is applied to new product development, emphasizing a human-centered approach to understanding user needs and requirements. Students learn skills related to industrial and product design, such as sketching, concept development, and aesthetics. By focusing on product design, students gain practical experience in applying Design Thinking principles to real-world projects.

Step 3: Design Management. Design Management expands the application of Design Thinking beyond product-specific contexts. It considers broader issues such as product management, marketing, financial considerations, and environmental requirements. Students learn to integrate Design Thinking into strategic decision-making processes, ensuring that design principles are aligned with business objectives and market needs.

Step 4: Business Management. This theme integrates Design Thinking into business innovation and strategy. Students explore how Design Thinking can be used to drive innovation across all aspects of a business, from business planning

to forecasting. By incorporating Design Thinking into business management practices, students learn to identify opportunities for innovation and develop strategies to capitalize on them.

Step 5: Professional Development. The final theme focuses on the professional development of individuals within the context of Design Thinking. It emphasizes the importance of leadership skills and the ability to nurture and support ideas to fruition. Students learn to recognize the value of Design Thinking in their professional lives and develop the skills needed to effectively lead and manage innovative projects.

4. Applying Design Thinking to Ecotourism Curriculum

To make the Ecotourism curriculum development and delivery guide more practical and comprehensive, the Educational Design Ladder and the concept of constructive alignment are applied to the ecotourism curriculum. Constructive Alignment is a curriculum design approach that aims to establish a strong connection between teaching objectives, teaching strategies, and assessment methods. This concept was first introduced by John Biggs (1996) [16], who emphasized that these three elements should be aligned with each other and work together to help learners achieve desired learning outcomes.

To this end, Biggs' SOLO taxonomy, also known as the Structure of the Observed Learning Outcome, illustrates how learning progresses in a cumulative manner. The model highlights significant transitions in the learning process and provides a hierarchical framework. The specific levels of the framework can be customized to match the content and level of the planned unit [16].

For this reasons, integrating Biggs' SOLO Taxonomy with the Educational Design Ladder in Ecotourism Curriculum is aimed at providing a structured approach to curriculum design that progresses students through the five themes/stages of ecotourism based on Design Thinking. By aligning the SOLO levels with each stage of the ladder, the curriculum is designed to gradually increase in complexity as students' understanding of ecotourism deepens. This, in turn, enables students' work to be assessed for higher order thinking skills, rather than for knowledge retention alone.

Also, applying Säljö's (1979) [17] conceptions of learning into the ecotourism curriculum emphasizes the importance of making connections and contextualizing theories within the learning process. This approach assumes that each level of learning builds upon previous levels, creating a cohesive and interconnected framework for understanding ecotourism concepts and practices. Säljö's (1979) [17] knowledge dimension further enhances this framework by classifying four types of knowledge that learners are expected to acquire or construct.

Table 1 shows the ecotourism Design Thinking curriculum consisting of five steps, each focusing on a specific type of knowledge, design thinking level, teaching topic, cognitive skill level, specific cognitive skills, key activities, key verbs, learning modes, and assessment methods.

Table 1. Ecotourism design thinking curriculum.

Step	1	2	3	4	5
Knowledge	Factual	Conceptual	Conceptual	Procedural	Metacognitive
Design Thinking level	Foundation level	Product level	Project level	Business level	Professional level
Teaching/Learning Theme	Ecotourism and Design Thinking theories, methods and philosophies	Ecotourism product design	Ecotourism design management	Ecotourism Business strategy	Personal development and Leadership
SOLO Taxonomy	Remember and Understand	Application	Analysis	Synthesis	Evaluation
Description	Recall or recognise information. Understand meaning, re-state data in one's own words, interpret, extrapolate, translate, including	Use or apply Ecotourism knowledge, put theory into practice, use knowledge in response to real Circumstances.	Interpret elements, Organizational principles, structure, construction, internal relationships; quality, reliability of individual components.	Develop new unique structures, systems, models, approaches, ideas; creative thinking, operations.	Assess effectiveness of whole concepts, in relation to values, outputs, efficacy, viability; critical thinking, strategic comparison and Review.
Activity	Multiple-choice test, recount facts or statistics, recall a process, rules, definitions; quote law or procedure. Explain or interpret meaning from a given scenario or statement, suggest treatment, reaction or solution to given problem, create examples or metaphors	Place ecotourism theory into practice. Demonstrate, solve and manage a design project/s	Identify constituent parts and functions of a process or concept, or de-construct a methodology or process, making qualitative assessment of elements, relationships, values and effects; measure requirements or Needs.	Develop plans or procedures, design solutions, integrate methods, resources, ideas, parts; create teams or new approaches, write protocols or contingencies. Review strategic options or plans in terms of efficacy, return on investment or cost-effectiveness	Develop personal and professional skills. Demonstrate the importance of developing the correct skills to recognise opportunities and nurture the process of bringing innovative ideas to fruition
Verb	Arrange, define, describe, label, list, memories, recognise, relate, reproduce, select, explain, reiterate, reword, critique, classify, summaries, illustrate, translate	Use, apply, discover, manage, execute, solve, produce, implement, construct, change, prepare, conduct, perform, react, respond, role-play	Analyse, break down, catalogue, compare, quantify, measure, test, examine, experiment, relate, graph, diagram, plot, extrapolate, value, divide	Develop, plan, build, create, design, organise, revise, formulate, propose, establish, assemble, integrate, re-arrange, modify	Review, justify, assess, present a case for, defend, report on, investigate, direct, appraise, argue, project-manage

Continued

Topic	Ecotourism nature and core criteria; ecological concepts; environmental conservation; cultural awareness; tourism management; Legislation and Regulations; Safety and Risk Management; Interpretation and education; research and education; case studies and best practices; reflection, ideation, design process, design history, defining design, creative thinking (idea generation), group dynamics, wicker problems, design contexts, visualisation, experimentation, prototyping	Idea generation, user focus, concepts, aesthetics, communicating visually, iterate and evolve theoretical and practical aspects of design, sketching, form and function. Ecotourism products include guided Nature Walks and Hikes; Community-based Home-stays; Ecological Tour and Workshops; Wildlife Watching and Conservation expeditions; Cultural Heritage tours and Indigenous experiences; Adventure and Eco-adventure activities; Volunteer and Conservation Vacations.	New product design and development, project management, marketing research, market identification and requirements, opportunity mapping, scenario planning, capital and variable costs, environmental Requirements, Sustainable destination planning; Community-based ecotourism initiatives; Ecological Restoration and Conservation Projects; Interpretive Trail Development; Cultural Immersion Experience; Adventure Tourism Experiences; Ecotourism Marketing Campaigns; Community-based ecotourism; Environment Education Camp; Nature-based Hiking	Strategic design, business frameworks, service design, comparative analyses of business opportunities, branding strategies, brand management, business plans, budgets and financial Management. Value proposition; Customer segments; Distribution Channels; Revenue Streams; Key Activities; Key Resources; Key Partnerships; Cost Structure; Customer Relationships; Channels of Communication. Membership-based Clubs; Subscription-based conservation initiatives; Revenue-sharing model with local communities	Work integrated learning, digital lectures, online discussion, independent research, Skype, blog posts, wikis, peer coaching
Learning modes	Lectures, tutorials, design charrette, group work, online modules, discussions, panel discussion, case studies	Short collaborative design projects, workshops, lectures, tutorials, field study, individual and group challenges	Workshops, partner with industry sponsors, lectures, tutorials, course readings	Workshops, industry projects, tutorials, study visits, online class discussions, group activities, individual research, selfdirected learning	Work integrated learning, digital lectures, online discussion, independent research, Skype, blog posts, wikis, peer coaching
Assessment	Analysis of ecotourism definition; reflective essay; active participation	Design projects. Written and oral, individual and group design activities	Oral Exam, project plan, research journal, intensive experimentation and project work, reflective essay	Business plans, pitches, business strategy simulation, exams, discussion online, blogs, workbooks, reflective essay	Reports, group work, presentations, critiques, solve industry-based problems, business reports, class participation

Step 1: Ecotourism Foundation Level

At this level, the emphasis is on factual knowledge of ecotourism, such as terms and definitions. The design thinking stage is establishing a foundation, and the teaching content is centred around introducing ecotourism and design concepts. Students need to identify, define, and list core concepts, with activities including reading, lectures, and memorizing terminology.

Step 2: Ecotourism Product Level

This level focuses on conceptual knowledge. Design thinking reaches the ecotourism product level. At this stage, students need to describe, explain, and apply the product design process, with group collaboration, brainstorming, and prototyping activities.

Step 3: Ecotourism Project Level

The focus here is on procedural knowledge. Design thinking is elevated to the project level, and the teaching content revolves around undertaking design ecotourism projects. Learners will analyze, plan, and execute the project through activities like case studies, simulations, and project management.

Step 4: Ecotourism Business Level

At this step, Design thinking reaches the ecotourism business level focusing on procedural knowledge and business applications. Students need to evaluate, examine, and critically think about the business feasibility of design solutions, with activities including market research, cost-benefit analysis, and investor pitches.

Step 5: Ecotourism Professional Level

This level cultivates self-directed learning abilities. Design thinking develops to the professional level, and the teaching content focuses on continuous professional development. Learners will create, build, and promote their design process through activities like seminars, mentorship guidance, and reflective journaling.

Assessment methods take appropriate forms for each stage, such as tests, reports, presentations, and portfolios.

In summary, the Ecotourism Educational Design Ladder systematically outlines the key content for each learning stage, providing a structured guide for teaching design thinking.

5. Pilot Program Implementation

To evaluate the effectiveness of the proposed Ecotourism Design Thinking Curriculum, a pilot program was conducted at Jinzhong University's Department of Tourism Management in China. The study involved a diverse group of 50 students over one semester.

5.1. Methodology

Pre- and Post-Surveys is conducted that students' critical thinking and problem-solving skills were assessed through surveys administered at the beginning and end of the semester. Subsequently, semi-structured interviews were con-

ducted with students and instructors to gather qualitative data on their experiences. And classroom interactions and project work were observed to assess student engagement and application of design thinking principles.

5.2. Findings

There was a significant improvement in students' critical thinking and problem-solving skills. Higher levels of engagement and satisfaction with the curriculum were reported from Students. These findings suggest that the integration of design thinking principles into the ecotourism curriculum enhances educational outcomes and prepares students for real-world challenges in ecotourism.

6. Conclusion

In order to adapt to the ever-changing ecotourism landscape, it is essential to incorporate new teaching methods that equip students with the necessary skills and attitudes that are highly valued in the modern tourism industry. This research presents a comprehensive ecotourism design thinking curriculum that outlines the key stages of the ecotourism curriculum in a structured and organized manner. Moreover, this ecotourism design thinking course integrates design thinking into the course's content, teaching methodologies, and assessment of learning outcomes to combine all these vital course elements.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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