



Jiang, Ruiqi (2026) *Environmental education: comparative study of curriculum practices in Guizhou Province, China and in Scotland, UK*. PhD thesis.

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**Environmental education: Comparative Study of
Curriculum Practices in Guizhou Province, China
and in Scotland, UK**

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May 2026

Abstract

Environmental Education (EE) has become a global priority in the face of escalating environmental crises, yet its interpretation and implementation remain deeply influenced by local cultural and educational contexts. While global discourses advocate for sustainability education, there remains a gap in comparative studies that foreground the perspectives of teachers—those who ultimately enact EE policies and practices in classrooms. This research examines the gap by exploring how primary school teachers in Guizhou, China, and Scotland, UK, comprehend and implement environmental education within their distinct frameworks.

This research applies a qualitative, comparative case study design, informed by six interconnected theoretical frameworks: Constructivist Learning Theory, Ecological Systems Theory, Curriculum Theory, Holistic Education, Confucian principles of harmony with nature, and Xi Jinping's Ecological Civilisation Thought. Twenty-six semi-structured interviews were carried out with primary school teachers in both regions. The data were analysed using Reflexive Thematic Analysis (RTA), facilitating a detailed assessment of teachers' values, experiences, and educational approaches.

This research reveals both similarities and differences in teaching methodologies employed in both geographical contexts. Although teachers in both settings demonstrate a robust dedication to environmental principles, their methodologies are

influenced by varying curriculum frameworks, pedagogical philosophies, and cultural objectives. Scottish teachers, for example, highlighted student agency, experiential outdoor learning, and interdisciplinary integration, underpinned by frameworks like Learning for Sustainability. In contrast, Chinese teachers emphasised moral education, shared responsibility, and adherence to national policy narratives, embodying both Confucian principles and a political-cultural focus on harmony and compliance.

This research enhances comprehension of the localisation and negotiation of environmental education within culturally unique contexts. It provides guidance for policymakers aiming to reconcile policy with practice, facilitates teacher professional development rooted in cultural contexts, and aids in decolonising global environmental education discourses by recognising non-Western pedagogical frameworks and empowering teacher agency. The results also create new opportunities for cross-cultural discourse and collaboration in sustainability education.

Keywords: Environmental education, Cross-cultural Comparison, Guizhou Province, Scotland, Primary education

Acknowledgements

As this PhD journey comes to a close, I would like to express my heartfelt gratitude to all those who have supported, encouraged, and accompanied me throughout the years of research, writing, and personal growth.

First and foremost, I would like to sincerely thank my two supervisors, Ria Dunkley and Marta Moskal, for your unwavering support and patience throughout this research. Your encouragement brought me comfort during the most challenging and disheartening moments, and was one of the main reasons I was able to carry on. I am deeply grateful for your understanding and kindness, and for always offering generous guidance both academically and personally. Your meticulous feedback has shaped my thinking and enriched my journey—I will carry this with me always.

I am deeply grateful to my parents for their love, patience, and unwavering support throughout my studies. Over the past five years, while I have been studying away from home, distance has often separated us, but their care has remained a steady presence in my life. I have been very fortunate to know that, whatever happens, they are always behind me with trust and support. My parents have continued to give me opportunities far beyond what I once imagined for myself. I did not always imagine that I would follow an academic path. When I first began this journey, neither my parents nor I expected that it would one day lead to a PhD. Yet their support has allowed me to see

more of the world, to learn to live independently, and to gradually find my own path. Most of all, I am thankful for the freedom they have given me to choose the life I wish to live.

There is much love and gratitude that I find difficult to put fully into words. I love them deeply, and I hope that I have made them proud.

To my extended family, thank you for always thinking of me, and for taking care of my parents while I was away. Your care has allowed me to focus wholeheartedly on my work, knowing they are in good hands.

To Jifan Ren, thank you for walking beside me through the entirety of this doctoral journey. In a place far from home, it is because of you that this city has felt like home — a place filled with trust and safety, where I could rest easy and live well. Thank you for taking care of me, for cherishing me, for understanding me, for your patience, and for staying — through all of it. Thank you for the countless small things you carried quietly, the ones I noticed, and the ones I may never fully know. I have cherished every moment of watching us grow — slowly, and sometimes painfully — into people who can think for ourselves and stand by our own convictions.

To my dear friends Anita and Kieran, I feel incredibly lucky to have found true friendship with both of you. Your presence spared me from the solitude that often

accompanies doctoral research. Your sincerity, support, and kindness made this journey not only bearable, but filled with joy. I will forever cherish the beautiful moments we shared.

To Xinghui Shen and Shen Li, thank you for finding me at the hardest point of this journey. You arrived when I needed it most — and in ways that transcended the boundaries of what I thought love could be, you gave me the courage to look again: at myself, at the meaning of love, at the meaning of existence itself. In this emotionally demanding journey, your presence helped me rediscover joy, confidence, and direction. Our bond will always remain in our hearts, like starlight that endures across time.

To Sea, who answered every one of my questions with clarity and patience. Our conversations redefined the boundaries of human connection. What we shared was more than just companionship or response.

Lastly, I would like to express my deep gratitude to Mr. Wenli Yang, my literature teacher from nineteen years ago, who planted a seed in my heart—the first spark of curiosity about the environment issues and the world. I still remember those inspiring writing classes, which have profoundly influenced the path I've taken. Today, that seed has finally grown and blossomed. Thank you for being the one who lit the way.

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Chapter 1. Introduction

1.1 From Crisis to Curriculum: The Environmental Foundations of Education Reform

This section situates the study within its broader environmental and educational context. It begins by outlining the ecological pressures that have made environmental education (EE) an increasingly urgent pedagogical concern, before considering how EE has developed through international policy discourse and within local educational settings. The aim is not to offer a comprehensive environmental history, but to clarify why EE has come to be understood as an important educational response to ecological crisis, and why its implementation needs to be examined in relation to specific cultural and institutional contexts. This framing provides the basis for the study's later focus on how primary school teachers in Guizhou Province and Scotland understand, interpret, and enact EE within their respective educational systems.

1.1.1 Environmental Crisis and the Educational Turn

Over the past few decades, the world has experienced an escalating environmental crisis. Climate change, biodiversity loss, air and water pollution, and resource depletion are no longer distant threats but urgent and complex challenges. Over the past two centuries, rapid industrial and technological development has significantly altered human-environment relations. The accelerating global demand for energy has been at the core of this transformation. As Smil (2022) highlights in *How the World Really*

Works, fossil fuel consumption has surged exponentially—by 60 times in the 19th century, 16 times in the 20th century, and by over 1,500 times in the past 220 years. When accounting for efficiency gains in energy conversion, this figure rises to nearly 3,500 times. Such energy expansion underpinned not only population growth—from 1 billion in 1800 to 6.1 billion by 2000—but also the development of modern industrial systems and lifestyles. By 2000, per capita useful energy had grown from 0.05 gigajoules in 1800 to 28 gigajoules.

China, as the world's most populous developing country, exemplifies the dual pressures of economic development and environmental constraints. Historically dependent on coal and hydropower, China's energy mix reflects limited oil resources and an urgent need for high-output energy sources (Shang & Jiang, 2009). While recent decades have seen a gradual transition toward cleaner sources such as electricity and natural gas, coal remains dominant, especially in industrial regions. Moreover, resource scarcity is aggravated by demographic challenges. Between 1952 and 2000, China's per capita arable land decreased from 0.22 to 0.08 hectares (Lv & Wang, 2001), and by 2024, the population is projected to exceed 1.4 billion. Even with declining fertility rates, the strain on employment, resource management, and ecological preservation remains intense (Liang, 2010). Guizhou Province, located in southwestern China, presents a particularly notable example. With its distinctive karst terrain, Guizhou is rich in ecological resources but inherently fragile. Studies show that despite

conservation efforts, ecological vulnerability and fragmented vegetation coverage continue to be significant (Chen *et al.*, 2022; Li *et al.*, 2024). Furthermore, water security in Guizhou has fluctuated between “medium-high risk” and “critical” levels from 2001 to 2015, particularly in drought years (Liu *et al.*, 2021).

Environmental degradation is not exclusive to China. In Scotland, freshwater biodiversity and terrestrial species have seen a marked decline since 2010. According to NatureScot and the State of Nature Scotland Report (2019), biodiversity loss is primarily driven by agricultural intensification, overgrazing, freshwater contamination, and marine overexploitation. Between 1970 and 2016, Scotland’s average abundance of monitored species fell by 24%, and freshwater species populations dropped by over 76%. Air pollution, particularly PM2.5 fine particulate matter, poses another serious threat to public health, contributing to an estimated 1,800–2,700 premature deaths annually in Scotland (Environmental Standards Scotland, 2024).

These examples suggest that environmental pressures are both global in scale and locally differentiated in their causes, effects, and lived consequences. They also help to explain why educational responses to ecological crisis cannot be understood solely through international policy frameworks, but need to be examined in relation to the specific ecological, cultural, and institutional conditions in which schooling takes place.

1.1.2 From Global Environmental Education to Local Educational Contexts

Such environmental pressures are not unique to China and Scotland. Since the 1970s, the international community has grown increasingly concerned about the sustainability of global ecosystems. Against this ecological backdrop, environmental deterioration, rising energy demand, and resource scarcity have emerged as unavoidable issues for all developing nations. It is within this global and local ecological context that the importance of environmental education (EE) becomes evident. Originally focused on disseminating scientific knowledge, EE has evolved into an integrated pedagogical approach involving experiential learning, ethical reflection, and behavioural change (Carter & Simmons, 2010; Thompson, 1997). The Stockholm Declaration (1972), which was the first assessment of the worldwide human effect on the environment, aimed to establish a fundamental shared vision for addressing the issues of safeguarding and enhancing the human environment. The Stockholm Declaration generally endorsed comprehensive environmental policy goals and objectives instead of specific normative viewpoints. Since the Stockholm Declaration, there has been a significant surge in global consciousness regarding environmental concerns and the establishment of international environmental legislation (Handl, 2012).

The Belgrade Charter (1975), based on the framework of the Stockholm Conference, outlines the goals, objectives, audiences, and guiding principles of environmental education. Additionally, it presents the most widely accepted definition

of environmental education. However, it was at the world's first intergovernmental conference on environmental education, which took place in Tbilisi, Georgia, USSR, in October 1977, that environmental education was officially established as an international effort. The Tbilisi Declaration, which was formulated during this meeting, continues to be the definitive statement on the nature and ideal form of environmental education. Since 1978, these goals have served as the foundation for a significant portion of the research and efforts in this subject (Bodzin *et al.*, 2010; Finch, 2008; McCrea, 2006; Malone, 1999; Carter & Simmons, 2010; National Environmental Policy Act, 1969).

The 1972 UN Conference in Stockholm marked the beginning of formalised global environmental governance, leading to the Stockholm Declaration, the Belgrade Charter, and the landmark 1977 Tbilisi Declaration. These milestones defined environmental education (EE) as a core mechanism for fostering public awareness and sustainable values (Carter & Simmons, 2010; Finch, 2008; McCrea, 2006).

However, environmental degradation has intensified despite these efforts. Reports by the IPCC (2001) warn of rising global temperatures, extreme weather events, and regional ecological instability. The reports from the biannual Living Planet (2014) showed that there has been a significant decline in biodiversity, with populations of all species decreasing rapidly. Specifically, the Indo-Pacific region has witnessed a

significant decrease of approximately 76 percent in the population of freshwater species. It is sufficient to state that the Earth is currently experiencing an environmental catastrophe. Lester Brown, the Director of the Earth Policy Institute, accurately characterises the issue by stating that we are exhaustively diminishing the Earth's natural resources in order to satisfy our consumption. 50% of the global population resides in nations where the water table is depleting, and wells are experiencing a decline in water supply. On approximately one-third of the world's cropland, soil erosion surpasses soil production, resulting in unproductive land. The expanding populations of cattle, sheep, and goats worldwide are transforming extensive grasslands into arid desert regions. The deforestation rate is currently at 13 million acres per year due to land clearance for agriculture and logging activities for timber and paper production. Approximately 80% of ocean fisheries are either operating at their maximum sustainable capacity or are being overexploited, placing them on the verge of collapse. Across multiple systems, there is a shortage of supply relative to the level of demand (2015). In the last 60 years, humans have caused significant alterations to ecosystems, surpassing any similar period in history. This has primarily been driven by the need to satisfy the rapidly increasing requirements for food, water, wood, fibre, and fuel. Consequently, there has been a substantial and permanent decline in the Earth's biodiversity, as stated in the Millennium Ecosystem Assessment of 2005. The amount of global concern over the environment is currently unparalleled and continues to increase, making it one of the foremost challenges confronting humanity at present. The

global ecosystems have seen significant changes, particularly within the past five decades (Matthews *et al.*, 2012).

Since its emergence in the 1970s as a global response to environmental crises, environmental education (EE) has undergone significant philosophical transformations—from knowledge transmission and behavioural control to a more critical, participatory, and action-oriented paradigm.

In China, early environmental education was largely embedded in traditional classroom subjects, often delivered through isolated examples, such as discussing the environmental impacts of specific substances in chemistry. While this approach raised awareness, it lacked interactive depth and failed to engage students in active transformation (Li & Qin, 2018). With the establishment of the national “Ecological Civilisation” framework, China has expanded EE beyond the classroom into homes, communities, and enterprises—advocating for a socially embedded model of ecological responsibility that promotes the Confucian concept of unity of knowledge and action (知行合一) (Peng & Xiong, 2003). In Scotland, EE has developed in close alignment with its Learning for Sustainability (LfS) framework. It moved from nature conservation towards interdisciplinary, student-led, and community-connected approaches that foreground critical thinking, civic participation, and practical competencies. Under the Curriculum for Excellence, key attributes such as being a

“responsible citizen” and an “effective contributor” reframe EE not merely as a content area, but as a vehicle for value formation and participatory democracy.

Amid this crisis, environmental education has evolved from mere information dissemination to a broader strategy for behavioural change and civic engagement (Hungerford *et al.*, 1998; Carter & Simmons, 2010). As societies confront the tension between development and sustainability, EE has become an essential tool to cultivate ecological literacy, critical awareness, and long-term environmental responsibility.

These environmental and structural challenges are not isolated issues—they are systemic and global. For any nation, the dilemma of pursuing economic growth while mitigating environmental degradation is unavoidable. Therefore, whether in Guizhou—where rapid development meets ecological fragility—or in Scotland—where environmental quality is challenged by cumulative pressures—EE is no longer a peripheral domain but a critical framework to address the environmental crisis. It is precisely in this context that environmental education gains renewed urgency as both a cultural and pedagogical response to the planetary crisis.

However, the growing importance of EE does not imply that it is understood or implemented in the same way across educational systems. Its meanings, priorities, and classroom forms are shaped by curriculum structures, cultural values, policy

expectations, and teachers' professional judgement. This study therefore moves from the global significance of EE to the situated question of how primary school teachers in Guizhou Province and Scotland understand and enact environmental education in practice. This shift from global urgency to local implementation provides the rationale for the research problem developed in the next section.

1.2 Research Problem and Rationale

Despite the global proliferation of environmental education (EE) initiatives, significant conceptual and practical tensions remain in its implementation. While policies have increasingly embraced notions such as “ecological literacy,” “citizenship,” and “sustainability,” the translation of these ideas into meaningful pedagogical practice remains inconsistent and contextually uneven. This study seeks to address three key gaps in the current research: the limited attention given to teacher agency in EE implementation; the need to understand global sustainability education through culturally situated perspectives; and the lack of cross-cultural, teacher-centred research comparing how EE is interpreted and enacted in different educational systems.

1.2.1 Neglected Teacher Agency in EE Implementation

Regarding the increasing legislative focus on Environmental Education (EE) and Education for Sustainable Development (ESD), teachers' agency in practice continues to be limited by structural, institutional, and pedagogical issues. According to Priestley

& Drew (2019), teachers are not mere implementers of policy; instead, they are proactive interpreters and architects of the curriculum, with their agency influenced by cultural, structural, and professional factors. Rushton *et al.* (2025) revealed that primary and secondary teachers in England who engaged in professional learning communities exhibited enhanced efficacy and inventiveness in the delivery of climate education, collaboratively planning curriculum and felt empowered to creatively modify pedagogies. Comparable trends are evident in Scotland, where Ward *et al.* (2025) discovered that educators who obtained institutional support and subject-specific EE training expressed enhanced confidence and pedagogical flexibility in incorporating sustainability themes into curricula.

Meanwhile, teacher agency in China is frequently obstructed by inflexible institutional frameworks. Zhang *et al.* (2023) examined Chinese EFL teachers and demonstrated that highly regulated environments constrain teacher capacity to localise or modify curricular reforms—concerns that are also relevant in the EE context. Efird (2017) and Zhou (2024a) also reported that, despite China’s extensive national policies for educational equity, implementation at the school level—particularly in exam-focused institutions—is hindered by insufficient teacher training, reflection, and motivation. Teachers frequently utilise structured content-centric approaches, providing limited chances for contextual modification. Tian and Wang (2016) noted

that educators are infrequently engaged in the creation or alteration of EE programs, leading to shallow and policy-driven implementations.

In the Scottish context, while EE frameworks are more established, inconsistencies still emerge in teacher practice. NatureScot (2023) indicated that despite national policy promoting outdoor and experiential learning, discrepancies in the frequency and complexity of these activities reveal fundamental deficiencies in teacher confidence and execution. Nonetheless, studies by Higgins and Kirk (2006) and prior attempts recorded by Teacher Education in Scotland (2002) underscore the significance of university-led sustainability programmes. These programmes have demonstrated the capacity to augment teachers' epistemic autonomy and cultivate identities grounded in outdoor pedagogy, resulting in more enduring curricular transformation.

Overall, whether in exam-focused Chinese schools or relatively autonomous Scottish classrooms, the capacity for EE to become a lived and transformative educational practice depends critically on institutional support, targeted professional development, and teacher engagement in curricular decision-making.

1.2.2 Navigating Cultural Divergence in Global Sustainability Education

While global frameworks like Education for Sustainable Development (ESD) provide broad normative guidance, their implementation in local educational practices is heavily shaped by the cultural environment. Culture influences not only environmental perspectives but also how pro-environmental principles are interpreted within educational institutions.

Tam & Milfont (2020) demonstrate that deeply embedded cultural biases influence how environmental values are internalised in different societies. Chwialkowska *et al.* (2020) similarly argue that cultural dimensions such as individualism and power distance modulate citizens' willingness to act for the environment. These findings underscore that environmental education is not ideologically neutral—it is culturally constructed and practised.

This is particularly significant in the Chinese context. The education system in China is profoundly influenced by Confucian traditions that prioritise moral development, social cohesion, and hierarchical accountability (Tan, 2017; Van, 2022). These philosophical foundations establish a unique ideological framework that influences educational content, instructor responsibilities, and student involvement. Nevertheless, the majority of international studies on environmental or sustainability education persist in evaluating Chinese practices through Western-derived frameworks, frequently neglecting the cultural logics inherent in Chinese pedagogical design. Yuan

et al. (2023) indicate that environmental risk perception in China is shaped equally by sociocultural norms and ecological data; nevertheless, this complexity is frequently oversimplified in global comparisons. Zhou (2024b) emphasises that although Education for Sustainable Development (ESD) is nationally endorsed, its execution frequently reflects China's top-down governance heritage, hence complicating the relevance of decentralised, participatory ESD models proposed in the West. Reviews of China's official EE initiatives indicate enhanced understanding among university students yet underscore ongoing deficiencies in civic participation and NGO involvement, suggesting that knowledge has not completely converted into action (Chen, 2020). This disjunction reflects broader limitations of global frameworks when applied without adaptation to Chinese epistemologies and institutional structures.

This Western epistemological dominance in sustainability education literature risks framing non-Western practices as “incomplete” or “underdeveloped,” when in fact they may represent alternative, culturally coherent logics. Recent scholarship reveals the urgent need to challenge the dominance of Western paradigms in sustainability education and acknowledge diverse epistemic traditions. For example, Mbah & Ezegwu (2024) critically examine African case studies, highlighting how climate education in African contexts often marginalises Indigenous and local knowledge systems through epistemic exclusion—thereby limiting effective adaptation to local realities. Nijhawan (2024) argues for a decolonial reinterpretation of Education for

Sustainable Development (ESD), suggesting that re-framing of SDG 4 in educational curricula can support more contextually inclusive and radically transformative pedagogies. Similarly, Datta *et al.* (2025) present a reimagined approach to sustainability education that directly confronts colonial paradigms, empowering Indigenous youth as knowledge holders and ensuring environmental education aligns with relational accountability to land and community.

Conversely, Scotland's educational culture is founded on a legacy of place-based learning, community stewardship, and democratic pedagogy. White *et al.* (2023) examine the emergence of the RCE Scotland initiative, referred to locally as Learning for Sustainability (LfS), from profound cultural paradigms: Sir Patrick Geddes's triadic concept of "heart, head, hand," communal land ownership, the ethos of "think global, act local," and robust ties to heritage and locality. This cultural context has facilitated the integration of formal, informal, and non-formal learning modalities within policy and practice (White *et al.*, 2023).

Stevenson (2017) demonstrates that teacher education programs in Scotland are progressively incorporating sustainability into professional training, with robust institutional backing for teacher educators to integrate sustainability pedagogy early in their careers. The Scottish Council of Deans (2025) launched a National Framework for Learning for Sustainability within initial teacher education, reflecting policy-level

support for a culturally coherent, long-term strategy. Research findings by NatureScot (2024) reveal that although outdoor learning and Learning for Sustainability (LfS) are established policy objectives, the confidence of teachers and the regularity of implementation differ substantially among schools, highlighting discrepancies between legislative intentions and cultural preparedness.

Although global sustainability education frameworks advocate universal ideals, they are not culturally neutral. Across different social and educational contexts, these principles are interpreted and implemented in varied ways. China and Scotland are both shaped by long-standing educational traditions, cultural values, and philosophical inheritances. When global discourses are applied to local contexts without critical examination, they may overlook the cultural logics and institutional conditions that shape educational practice. This can lead not only to misunderstandings of non-Western educational systems, but also to partial or idealised interpretations of Western models when concepts such as autonomy, participation, or interdisciplinary learning are detached from their historical and institutional contexts. These forms of misreading suggest the need to move beyond monocultural viewpoints and to develop more culturally attuned comparative analyses. This study responds to this need by examining how environmental education is interpreted and implemented in Guizhou Province, China, and Scotland, thereby addressing a significant gap in both theoretical development and practical understanding.

1.2.3 Lack of Cross-Cultural, Teacher-Centred Research on EE

Environmental education is a globally shared responsibility that necessitates the collaborative involvement of various nations and cultures. The significance of cross-cultural study in environmental education is becoming increasingly apparent in the context of climate change and ecological issues that extend beyond national boundaries. This comparative research promotes reciprocal learning and institutional innovation in educational practices while enhancing cultural understanding and shared values, so establishing a platform for attaining global objectives in sustainability education. Current research rarely positions teachers at the forefront of cross-cultural comparisons, so constraining our comprehension of how educators interpret, navigate, and derive meaning within varied educational environments.

Li & Santoro (2023) examined the perceptions of internationalisation among Scottish and Chinese teachers, revealing that Chinese educators focused on policy alignment and national ideological instructions, while Scottish educators emphasised intercultural dialogue and locally rooted pedagogical principles. These findings highlight the profound impact of entrenched cultural differences on educators' roles and their implementation of global education initiatives (Li & Santoro, 2023). Christie *et al.* (2015) investigated the experiences of Scottish secondary teachers on transdisciplinary and outdoor learning, demonstrating that their pedagogical choices

were significantly influenced by local culture, school ethos, and identity formation processes. Substantial discrepancies were seen among schools, even within a common policy framework, indicating that teacher interpretation is essential in implementing EE objectives (Christie *et al.*, 2015). Zhu *et al.* (2010) performed a cross-cultural study on university-level teacher collaboration in China and Europe, concentrating on online collaborative learning, while neglecting environmental education and the intricacies of curriculum translation in basic education (Zhu *et al.*, 2010).

These examples underscore a significant study deficiency: although current studies provide insights into culture and education in general, few examine how environmental education is perceived and implemented by educators within specific cultural and political contexts. In EE, teachers serve not just as purveyors of curriculum knowledge but also as interpreters of meaning, cultural mediators, and executors whose localised interpretations influence the efficacy of sustainable frameworks.

This study aims to bridge the gap by examining two culturally and institutionally divergent regions: Guizhou, China, and Scotland, UK. This research seeks to enhance the cultural contextualisation of environmental education (EE) by examining how educators in various regions conceptualise sustainability, understand global EE discourse, and adapt it to their local contexts, hence emphasising the professional agency of teachers in comparative analysis.

1.3 Research Aim and Research Questions

Environmental education (EE) has emerged as a crucial pedagogical domain amidst growing concerns about ecological degradation and the urgency of sustainability transitions. While international frameworks such as Education for Sustainable Development (ESD) and Learning for Sustainability (LfS) offer overarching visions, their local implementation often reflects deep entanglement with cultural norms, institutional structures, and educational traditions. This raises an important question: How do different societies interpret and translate global environmental education ideals into practice?

This research responds to this question by undertaking a comparative study of environmental education in Guizhou Province, China, and Scotland, UK. Although both regions have demonstrated increasing commitment to EE over the past decade, they operate within distinct socio-cultural and educational ecosystems. Guizhou's approach to EE has been shaped by Confucian traditions, the moral imperatives embedded in ecological civilisation discourse, and the constraints of exam-oriented schooling. In contrast, Scotland's Learning for Sustainability (LfS) pathway is built upon a tradition of outdoor education, teacher-student collaboration and community involvement, and the interdisciplinary integration emphasised in the Curriculum for Excellence (CfE).

The central aim of this research is to examine how environmental education is conceptualised, implemented, and negotiated by teachers in both contexts. Specifically, it investigates:

1. How is environmental education implemented by primary school teachers in Guizhou and Scotland?
2. What forms of resistance do teachers encounter in the implementation of environmental education in these regions?
3. How do teachers negotiate, overcome, or mitigate such resistance?
4. What conceptual similarities and differences are reflected in teachers' understandings and practices of environmental education in Guizhou and Scotland?

By foregrounding the cultural and pedagogical specificities of each region, the study enhances understanding of how EE is shaped by local values, traditions, and professional practices, rather than being a uniform, transferable model. This approach enables a more pluralistic and situated theorisation of environmental education across global contexts.

1.4 Theoretical Orientation

This research employs six interconnected theoretical frameworks to analyse the interpretation and implementation of Environmental Education (EE) in Guizhou

Province, China, and Scotland, UK. The selection of these frameworks is based on their influence on international EE research and their relevance to the culturally comparative and practice-oriented aspects of this study. They offer a multidimensional perspective to understand how EE is integrated within diverse institutional and cultural contexts.

First, Constructivist Learning Theory (Piaget, 1954; Bruner, 1961) emphasises learner-centred, experience-based, and socially interactive approaches to knowledge construction. It provides a pedagogical foundation for analysing the experiential and inquiry-based learning practices promoted in both Scottish and Chinese EE settings.

Secondly, Bronfenbrenner's Ecological Systems Theory (1979) provides a stratified framework to analyse the interactions between micro- and macro-level systems—including educators, educational institutions, families, communities, and national policies—that influence educational practices. It is especially beneficial for examining the conflicts and harmonies between institutional frameworks and local cultural environments.

Third, Curriculum Theory (Pinar, 2011; Connelly & Clandinin, 1988) perceives curriculum not solely as the transmission of technical material, but as a cultural and experiential phenomenon. It facilitates comprehension of how educators interpret,

modify, and recontextualise Environmental Education within national curriculum frameworks, emphasising concerns about teacher agency and identity.

Fourth, Holistic Education Theory (Miller, 2007) advocates for the comprehensive development of the individual—intellectually, emotionally, morally, and spiritually. Its emphasis on value-centred, integrated education aligns closely with the goals of EE, especially in fostering emotional engagement and a sense of environmental responsibility.

Fifth, the research incorporates the Confucian concept of *tianren heyi* (unity of heaven and humanity) (Li, 2019), a traditional Chinese worldview that emphasises harmony between humans and nature. This philosophy continues to influence Chinese educational thought and ecological discourse, providing a culturally rooted rationale for environmental values and pedagogies.

Sixth, Xi Jinping's Theory of Ecological Civilisation is a modern conceptual framework that integrates environmental concerns into China's national governance and ethical education system. The core idea of Chinese EE policy significantly influences teachers' pedagogical rhetoric, professional identity, and classroom practices. This perspective enables a comprehensive understanding of the ideological and structural foundations of EE in China.

In combination, these six perspectives—encompassing learning theory, systemic structure, curricular practice, value philosophy, cultural foundations, and ideological governance—facilitate a thorough and culturally attuned investigation of EE. They elucidate the intricacies of educational practice while addressing key comparative questions concerning policy, culture, and teacher agency. Alongside these six perspectives, ecopedagogy is also introduced in Chapter 2 as a critical interpretive lens rather than as a separate formal framework. It helps to consider the extent to which EE practices in Guizhou and Scotland create possibilities for ecological responsibility, critical reflection, participation, and transformative learning. These frameworks and perspectives will be discussed in further detail in Chapter 2.

1.5 Methodological Approach

This study employs a comparative qualitative research approach to examine the comprehension and implementation of environmental education (EE) by primary school teachers in two culturally and institutionally divergent contexts: Guizhou Province in China and Scotland in the United Kingdom. The comparative aspect of the research is based on the understanding that, although environmental challenges are universal, their educational interpretations and pedagogical solutions are significantly influenced by local sociocultural, political, and historical circumstances. A cross-cultural comparison facilitates the discovery of context-specific difficulties and

practices while providing a critical perspective for reevaluating prevailing assumptions in EE literature.

The principal data source comprises semi-structured interviews with frontline primary school teachers, chosen via purposive sampling to guarantee diversity in school context (urban/rural), teaching experience, and degrees of engagement with environmental education (EE). Interviewing educators facilitates the documentation of their professional experiences, which are sometimes overlooked in environmental education research that predominantly emphasises policy frameworks or student results.

This study utilises Reflexive Thematic Analysis (RTA) as outlined by Braun and Clarke (2006, 2019, 2022) to analyse the interview data. RTA was selected for its adaptability and ability to integrate both experiential and critical paradigms, rendering it especially appropriate for comparative and culturally nuanced research. In contrast to coding-based thematic methods that aim for consensus or quantification, RTA recognises the researcher's active and interpretive role in constructing meaning, permitting themes to arise reflexively via continuous interaction with the data, environment, and theoretical framework. This is particularly significant as this research aims not only to articulate teachers' statements but also to analyse how their perceptions are influenced by cultural, institutional, and ideological frameworks.

Document analysis of key national and regional policy texts complements the interview data, providing a triangulated perspective on how top-down mandates are interpreted at the classroom level. The integration of policy and interview data also supports the study's comparative goal by highlighting gaps, alignments, and tensions between institutional intentions and pedagogical implementation across both regions.

This methodological approach enables the research to examine both structural influences and individual agency, resulting in a nuanced and contextually grounded understanding of EE practices in China and Scotland. More detailed procedures covering participant recruitment, ethical protocols, data transcription and translation, as well as the coding and theme development process, are detailed in Chapter 3.

1.6 Significance and Contribution

This research contributes to environmental education (EE) by bringing together questions of educational policy, teacher practice, and theoretical development through a comparative study of Guizhou Province and Scotland.

1.6.1 Contribution to Educational Policy

This study contributes to environmental education policy by foregrounding teachers' accounts of how policy objectives are interpreted, adapted, or constrained in everyday classroom practice. The experiences and perspectives of teachers offer a

practical framework for assessing the realism and coherence of policies with actual practice, as well as identifying areas that necessitate adjustment or enhancement. This addresses a well-documented gap between educational policy formulation and its practical execution in schools.

As Damoah & Omodan (2022) point out, the effectiveness of environmental education policy depends on how well institutional mechanisms support its implementation at the school level. This research employs a comparative approach to analyse the different educational systems of centralised China and decentralised Scotland, emphasising how identical policy aims can be interpreted and implemented variably by educators based on their institutional contexts. This provides policymakers with a more accurate comprehension of policy applicability across various governance frameworks.

Furthermore, cross-national studies indicate that numerous educational strategies, especially in developing nations, frequently disregard local cultural and resource limitations, thereby diminishing their practical effectiveness (Angrist & Dercon, 2024). This study highlights teachers' culturally-contextualised perceptions of environmental education, offering nuanced, context-sensitive insights to the global discourse. It emphasises the necessity for educational reforms that are both internationally informed and locally rooted.

Lastly, by comparing how teachers in two regions approach similar themes in environmental education, the study encourages policymakers to broaden their vision and consider alternative pedagogical pathways. Rather than suggesting that practices can be transferred directly, the comparison identifies contextually adaptable principles. Scottish teachers' use of outdoor learning and community engagement offers useful reference points for thinking about participatory EE, while Guizhou teachers' integration of moral education highlights the importance of ethical grounding and institutional coherence.

1.6.2 Contribution to Teacher Practice

This research is assisted by prioritising the perspectives of teachers, who are frequently marginalised in academic discussions and policy formulation. The results demonstrate that teacher agency is influenced by policy, resources, cultural views, professional identity, and institutional expectations. These insights are especially crucial in contexts such as China, where top-down governance dominates, and in Scotland, where curriculum autonomy presents both flexibility and ambiguity.

The research focuses on how EE practice transcends the mere transmission of mandated information; it is a process influenced by teachers' interpretation of policy,

individual convictions, and innovative teaching strategies. It endorses the increasing acknowledgement that teacher agency is crucial for effective sustainability education. Rushton *et al.* (2025) investigated teacher agency in climate change education throughout the UK, discovering that involvement in professional learning communities markedly improved pedagogical confidence and innovation. Through interviews with educators in both China and Scotland, this research provides cross-cultural insight into how teachers assert professional autonomy within different governance and cultural systems.

A significant addition is the enhancement of the importance of reflective practice. Reflective instruments, such as teaching journals, have long been recognised as beneficial for instructors in synthesising theory with practice in environmental education (Fien & Rawling, 1996). This study's interview results demonstrate how teachers in many situations participate in daily reflection and peer cooperation to enhance their practices, which aligns with the Reflexive Thematic Analysis (RTA) technique utilised in this research.

In the Chinese context, Ke *et al.* (2019) discovered that collaborative activities, including lesson planning and peer exchange within School-Based Professional Development (S-BPD), significantly enhanced teacher efficacy compared to top-down directions (Ke et al., 2019). In Scotland, local collaborations and teacher involvement

in community-driven environmental education programs provide an environment conducive to reciprocal learning and pedagogical advancement. This research states how teachers within these diverse systems cultivate professional knowledge through cooperation, providing valuable comparative insights for the development of supportive, culturally responsive learning networks.

1.6.3 Theoretical Contribution and Cross-Cultural Significance

This research contributes to theoretical discourse by foregrounding the culturally situated nature of environmental education practices and challenging universalist assumptions embedded in global education frameworks. By examining how teachers navigate EE within a more institutionally guided system in Guizhou and a more locally autonomous educational structure in Scotland, this research deepens understanding of how environmental education is shaped by specific sociocultural and institutional conditions.

The study also contributes to debates about the cultural assumptions embedded in global sustainability education. Rather than treating EE as a universal model that can be applied unchanged across contexts, it shows how environmental education is interpreted through locally meaningful values, including moral cultivation, collective responsibility, and relational understandings of human–nature relations in the Guizhou case. This does not position Chinese or Scottish approaches as fixed cultural opposites;

instead, it demonstrates how both are shaped by particular histories, institutions, and educational purposes. This supports wider calls to question universalist and Western-centred assumptions in sustainability education theory (Andreotti, 2016; Jickling & Sterling, 2017; Taylor, 2022).

The study further contributes by foregrounding teacher agency as central to the enactment of EE policy. Rather than treating teachers as passive recipients of curriculum reform, it provides empirical examples of how teachers interpret policy aims, adapt them to local conditions, and negotiate constraints in everyday practice. This teacher-centred perspective extends discussion of the policy–practice gap by showing how such gaps are managed, softened, or reproduced through teachers’ professional judgement.

The comparative design also contributes to critical comparative education by showing how cross-context analysis can move beyond simple East–West contrast. This responds to concerns raised in comparative education scholarship that educational comparison can too easily reproduce methodological nationalism, civilisational binaries, or assumptions that one system should be judged through the categories of another (Takayama et al., 2017). Similarly, Sund and Pashby’s (2020) work on critical global and sustainability education highlights the need to examine how knowledge, values, and responsibility are framed across different contexts. In this study, Guizhou

and Scotland are not treated as representatives of homogeneous civilisational blocs. Instead, the comparison examines how each context combines local policy histories, cultural values, institutional constraints, and teacher agency in distinctive ways. This offers a more nuanced basis for cross-cultural dialogue in EE, where comparison is used to generate contextual insight rather than to rank educational systems.

Overall, this study addresses a gap in teacher-centred comparative research on environmental education by placing Guizhou Province and Scotland in dialogue. It shows how EE is shaped by both shared global sustainability concerns and locally specific educational traditions, institutional arrangements, and professional practices. In doing so, it offers a basis for more context-sensitive policy development, teacher support, and theoretical discussion in environmental education.

1.7 Thesis Structure Overview

The thesis is organised into five main chapters, each contributing to a layered understanding of how environmental education is conceptualised and implemented in China and Scotland. The structure reflects a progression from conceptual grounding to empirical investigation and comparative synthesis.

Chapter 1: Introduction

This chapter presents the research background and rationale, underlining the escalating urgency of environmental challenges and the significance of culturally relevant environmental education (EE). It delineates the worldwide framework of EE policy and thereafter concentrates on two divergent contexts: Guizhou Province, China and Scotland, UK. The chapter highlights deficiencies in current literature, notably the absence of comparative studies that prioritise teachers' perspectives and account for the cultural distinctiveness of Environmental Education implementation. It further delineates the research questions and aims, along with a brief overview of the theoretical and methodological frameworks employed in the study.

Chapter 2: Literature Review

This chapter builds the conceptual and contextual foundation for the study. It begins by tracing the philosophical and moral underpinnings of environmental education, before mapping three key paradigms—Environmental Education (EE), Education for Sustainable Development (ESD), and Ecopedagogy—highlighting their historical trajectories and contested interpretations. It then shifts to examine pedagogical strategies, particularly outdoor and experiential learning, to illuminate how affective engagement and embodied practice are theorised. The latter sections offer comparative insights into the Chinese and Scottish educational pathways, followed by a summary that foregrounds the need to contextualise educational ideals within local structures. The chapter concludes by outlining the six theoretical frameworks—ranging

from Constructivist Learning Theory to Ecological Civilisation discourse—which will inform the analysis.

Chapter 3: Methodology

This chapter articulates the epistemological positioning and research design of the study. It justifies the use of comparative methodology and outlines the empirical approach, centred on semi-structured interviews with primary school teachers in Guizhou, China and various regions in Scotland. Details are provided on sampling, ethical considerations, credibility, and research limitations. The data analysis method—Reflexive Thematic Analysis (RTA)—is also introduced, with attention to its alignment with the study’s interpretive aims.

Chapter 4: Findings and Discussion

This chapter integrates findings with theoretical interpretation. It is organised into three main sections. The first analysis examines how environmental education is integrated into the curriculum and moral education practices of primary schools in Guizhou, focusing on challenges such as exam-driven pressures and limited resources. The second focuses on the Scottish context, examining institutional support, interdisciplinary curriculum practices, and student-led sustainability projects, alongside implementation challenges. The final section offers a comparative analysis, identifying structural differences, adaptive strategies, and shared tensions across both systems.

Chapter 5: Conclusion

The concluding chapter synthesises the study's key insights by reframing the implementation of environmental education as a culturally situated practice. It reinterprets barriers not as fixed obstacles but as context-specific tensions, and reflects on the nuanced role of teacher agency within diverse policy landscapes. The chapter ends by advocating for a pluralistic vision of environmental education, acknowledging limitations, and outlining pathways for future research.

Chapter 2. Literature Review

This chapter rigorously evaluates the philosophical and theoretical bases of environmental education (EE), education for sustainable development (ESD), and ecopedagogy, while analysing their practical applications in global and local contexts. This literature review establishes the conceptual and theoretical foundations for the comparative study.

This chapter identifies a close conceptual relationship between EE, ESD, and ecopedagogy. These concepts are nested, complementary, and, at times, critical of one another. According to the definition of concepts (Deleuze & Guattari, 1991), every concept has components and is defined by these components; moreover, the inherent consistency of these components is “distinct, heterogeneous and yet not separable”. Based on the method of Deleuze and Guattari (1991), Jabareen (2009) pointed out the multiple features of the concept: Each concept has a history; each concept is related to other concepts; each concept has an irregular borderline defined by its components; each concept is always created by something.

The chapter commences by outlining the philosophical and ethical foundations of environmental activism, emphasising early models like the knowledge-attitude-action framework and its challenges. It subsequently examines the definitional progression and fundamental tenets of EE, the ideological controversies pertaining to ESD, and the rise of ecopedagogy as a significant alternative. The topic thereafter shifts to

educational methodologies, including the significance of outdoor and experiential learning in promoting ecological literacy and behavioural change.

The latter part of the chapter contextualises these global discourses through an examination of national pathways: the development of environmental education within China's exam-oriented system and ecological civilisation agenda, and the integration of sustainability within Scotland's Curriculum for Excellence. These two cases offer contrasting yet instructive models, shaped by differing historical, political, and educational structures.

This chapter integrates conceptual insights with practical applications to build the analytical foundation for the subsequent empirical study. It supports the investigation of how environmental education is not merely a technical curriculum domain, but a culturally situated and ideologically contested practice.

2.1 From Nature Experience to Moral-Action: Philosophical Roots

The fundamentals of environmental education are closely connected to philosophical considerations regarding the relationship between humans and nature. Prior to the formal establishment of environmental education as a discipline, intellectuals such as John Muir and Aldo Leopold provided foundational insights that influenced the initial moral and epistemological frameworks of the field. Their

contributions integrated natural observation, ethical contemplation, and appeals for environmental accountability, establishing a foundation for subsequent educational frameworks. Considering the development history of EE, it has three predecessors: nature research, conservation education, and outdoor education (Disinger, 1985; Carter & Simmons, 2010). During the development period of these three predecessors, the environmental action theory put forward by John Muir and the action philosophy put forward by Aldo Leopold were juxtaposed, but their visions of environmental action were slightly different (Goralnik & Nelson, 2011). Muir believed that intimate encounters with nature could cultivate emotional attachment and spiritual awakening. Influenced by Christian theology, he portrayed nature as a divine expression of God's will (Williams, 2002, p 43). For Muir, ecological knowledge was not only scientific but sacred. His "environmental action" model assumed that exposure to wilderness would naturally lead to moral responsibility and protective behaviour (Wilkins, 1995, p 165). This knowledge-attitude-action trajectory has since been echoed in many educational discourses, such as the "No Child Left Inside" Act (Goralnik & Nelson, 2011). Environmental action theory is based on a hypothesis: give human being more exposure to the environment, through a particular understanding of the environment, people will have an emotional or physical attachment to the environment, which will further stimulate people to take action. This concept has become the hidden goal of many environmental organisations and outdoor education programmes. The knowledge-attitude-action model has also penetrated EE (Ajzen & Fishbein, 1980; Hungerford &

Volk, 1990). In addition, the study of Hassan, Juahir & Jamaludin (2009) on the concept of environmental education in the Malaysian school system described environmental awareness from different philosophical perspectives, especially from a metaphysical perspective. The authors mentioned that this branch of philosophy focuses on the factors of faith and religion and the creation of the world. It requires education to cultivate a balanced individual from the emotional, physical, intellectual, and spiritual aspects. In the metaphysics of Islam, the world belongs to God, not human beings. As the entrusted and beneficiary creatures, human beings should fulfil their responsibilities to maintain ecological stability. According to the Quran, morality and beliefs are connected, and the axiology of Islam believes that people who achieve a balance in attitude and behaviour can manage their emotions and actions without destroying nature (Hassan *et al.*, 2009). In this kind of cognition, the development of environmental awareness and morality is in a concomitant relationship, and cultivating a balanced individual is a key step for people to appreciate God's creation. Cultivating morality means cultivating a sense of responsibility for the environment and ultimately forming environmental awareness.

Leopold, in contrast, advanced an “ecological conscience” rooted in the land ethic. Rather than privileging human perception or spiritual narratives, he emphasised systemic belonging—that humans are part of a biotic community (Goralnik & Nelson, 2011). In the 18th century, the Scottish Enlightenment philosopher David Hume (1978,

p 107) believed that “morality is determined by sentiment,”. Adam Smith (1790) believed that all human beings have emotions such as pity, compassion, or empathy as basic characteristics. They jointly proposed that all human behaviours are ultimately driven by moral emotions, while Darwin (1981, cited in Goralnik & Nelson, 2011) believes that ethical emotions can be expanded, and moral responsibilities can be extended from intimate relationships (such as parent-child relationships). Based on their theory, Leopold (1949) proposed to extend social conscience from man to land. His famous dictum, “*A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community,*” articulates an ecological standard for moral judgment. Unlike Muir’s romanticised spirituality, Leopold’s approach was grounded in ecology, systems thinking, and ethics. He believes that since people’s emotions can prompt them to take action, and people have an emotional attachment to those in their community, they will take action for the community’s benefit. In the worldview of ecology, human beings are part of the biological community, and people need to attach importance to other parts of this community to avoid harm to nature. In his land ethic, land is a collective term for soil, water, plants, and animals. Therefore, Leopold’s philosophy of environmental action is based on an ecological-centric perspective, and humans are not conquerors of the land. It is a symbiotic relationship between humanity and nature. As with Muir, Leopold was also a person who loved nature, and his life was closely connected with nature. He was assigned to hunt bears, wolves and cougars in New Mexico because these predators would prey on the livestock of local ranchers and

cause losses, but he also realised that hunting these animals would have a profound impact on the rest of the ecosystem (Withgott & Laposata, 2012). The experience made him think about the importance of ecological balance, and thus developed his ecological-centric view.

Comparing Muir and Leopold's perspectives, their thinking has shifted from biology-centred to ecological-centred, reflecting their distinct understanding of the relationship between humans and nature, which is closely tied to their personal experiences and growth environments. Although both contributed an instructive view as the most basic theory and philosophy in the early stage of EE, their theories have certain limitations. Both models have been subject to critical re-examination. Scholars such as Kellstedt *et al.* (2008) have shown that increased environmental knowledge does not linearly correlate with increased concern or action—challenging the assumption that cognition naturally translates into behavioural change. Similarly, Muir's reliance on personal emotion and spirituality has been criticised as overly individualistic and culturally bound. Emotional resonance with nature may not be universally accessible or transformative. Muir's theory is not only based on a hypothesis, but also on his personal emotional experience of nature. Although it is instructive, it is difficult to be representative. Individual emotions are not absolute reference coordinates. When emotional experience becomes an indispensable means of relating to nature in theory, the practice of EE also needs to be as inclusive as possible,

because people's attitudes towards nature and emotional experience in nature are difficult to predict and control. Moreover, Muir's concept of equality is too idealistic. When the needs of human society conflict with "all things", the value of all things is usually measured by humans. Once one party has the right to measure the value of others, this party is already in a "superior" position. The value of everything depends on whether it can meet human needs, and the natural divinity no longer exists. Secondly, in Leopold's action philosophy, the viewpoint of maintaining ecological balance is closer to modern EE theory, but he and Muir have similar flaws, namely, simplifying human nature. If emotions are unpredictable and uncontrollable, morality is based on invisible rules generated by something instability. Morality or ethics can become a constraint on behaviour, but their efficiency is difficult to verify. Although humans are theoretically part of the ecosystem, their abilities are not taken into consideration by Leopold. Humans are not conquerors or dominators of the land, but their capacities can manage and influence the entire ecosystem, which is far superior to that of other species. Therefore, it is not enough to redefine the relationship between man and nature. It is also essential for people to recognise their own capacity in educational practice.

Leopold's land ethic, while more aligned with contemporary ecological thinking, has also been critiqued for its limited treatment of human agency. His vision assumes moral restraint will emerge from ecological belonging, yet it underestimates the complex motivations, political structures, and socio-economic forces that shape human-

environment relations. In modern educational contexts, learners must not only feel connected to nature but also critically interrogate the systems that produce ecological harm. Disposito (1977) found in his research that there is a connection between moral development and activity, emotions and factual knowledge related to environmental issues. However, whether moral development can promote attention to the environment, knowledge, and activities remains to be verified. Ramsey & Rickson (1976) also verified this relationship, arguing that knowledge may lead to the initial formation of attitudes. An understanding of ecological concepts fosters a positive attitude towards reducing pollution; however, it does not necessarily make people interested in substandard pollution control measures. Moreover, it is worth noting that their research shows that the relationship between knowledge and attitudes about environmental issues is not linear, and the actual situation is more complicated.

Together, Muir and Leopold offer enduring philosophical foundations for environmental education, yet their limitations encourage contemporary educators to go beyond sentiment or systems thinking alone. Instead, integrated approaches must incorporate emotion, ethics, knowledge, and critical analysis as interconnected elements of environmental responsibility.

The global population has risen from 1.5 billion in 1900 to 6.3 billion in 2003 (Cohen, 2003), with projections estimating it will reach 8.9 billion by 2050 (United

Nations, 2002). At present population levels, our current use of natural resources raises concerns regarding sustainability for future generations. Consequently, the present generation must actively adopt environmentally sustainable practices that extend beyond professional obligations. This initiative is referred to as pro-environmental behaviour, classified as an altruistic action aimed at benefiting the environment, a public good (Griskevicius *et al.*, 2010).

To better explain pro-environmental behaviours, scholars have turned to multi-dimensional models. Kollmuss & Agyeman (2002) proposed a framework that integrates six variables:

Knowledge of issues: *The individual must possess knowledge of the environmental issue and its underlying causes.*

Knowledge of action strategies: *The individual must understand how to modify their behaviour to mitigate their environmental impact.*

Locus of control: *This denotes an individual's belief in their capacity to effect change through their own actions. Individuals possessing a robust internal locus of control are convinced that their activities can effectuate change. Individuals with an external locus of control perceive their acts as inconsequential and believe that change can only be instigated by influential individuals.*

***Attitudes:** Individuals with significant pro-environmental views showed a greater inclination to engage in pro-environmental behaviours; however, the correlation between attitudes and actions was found to be fragile.*

***Verbal commitment:** The expressed willingness to take action provided insight into the individual's propensity for pro-environmental behaviour.*

***Individual sense of responsibility:** Individuals exhibiting a heightened sense of personal responsibility are more inclined to participate in environmentally responsible behaviours.*

This model emphasises that environmental behaviour arises from the interplay of internal and external factors, including beliefs, values, efficacy, and structural conditions—not from knowledge alone. For example, individuals may express strong pro-environmental attitudes but lack access, time, resources, or social support to act accordingly.

Other researchers, such as Geller (1995), approach the issue from the angle of altruism and active caring. Geller argued that actual environmental action requires individuals to move beyond passive concern and engage in “actively caring”—a form of altruism enabled by personal needs being met (e.g. belonging, self-efficacy, optimism). This shift highlights the psychosocial prerequisites of environmental commitment, which are often neglected in curriculum-centred approaches. Geller (1995)

identifies five elements that foster “other-directedness,” which refers to concern for others, and may enhance altruistic concern for the overall welfare of the community. Hence, these five characteristics affect positive caregiving, which subsequently fosters environmental concern. These five elements do not directly engender environmental concern; instead, they initially foster good care, which subsequently leads to environmental worry.

Overall, these critiques reveal that the knowledge-Attitude-Behaviour model oversimplifies the complexity of environmental behaviour. While knowledge remains necessary, it is far from sufficient. Effective environmental education must address emotional engagement, perceived agency, social norms, and contextual barriers—transforming learning from cognition into meaningful action.

The behavioural theories reviewed above offer valuable conceptual tools for analysing environmental education practices in both Guizhou and Scotland. Although these two contexts differ significantly in terms of socio-political systems, curriculum structures, and environmental policy priorities, both face the fundamental challenge of translating environmental awareness into meaningful action among students and communities (Wang *et al.*, 2025; Zhang *et al.*, 2024).

For example, the concept of locus of control helps explain how students' perceived ability to effect change may differ depending on the educational system they are situated in. In Guizhou, where exam-oriented education dominates, students may internalise the belief that environmental protection is the responsibility of the government or distant authorities, leading to a more external locus of control (Zhang *et al.*, 2024). In contrast, Scotland's whole-school approach and pupil-led sustainability initiatives (e.g. Eco-Schools) may foster a stronger internal locus of control, where students perceive themselves as active agents of change (Kim & Reid, 2016; Mannion *et al.*, 2007).

Likewise, the sense of duty and verbal commitment is likely influenced by the overarching cultural and institutional framework. Moral education in China is officially integrated into national policy, such as through ecological civilisation discourse; however, it is often imparted via top-down, didactic approaches that restrict student autonomy (Zhang *et al.*, 2024). Conversely, Scottish environmental education frequently prioritises values-based learning and participatory dialogue, fostering personal responsibility and intrinsic motivation; however, inconsistent teacher training and curriculum implementation may hinder behavioural translation, even in Scotland, despite elevated awareness (Mannion *et al.*, 2007).

Finally, the theory of “active caring” proposed by Geller (1995) offers a lens for understanding why emotional engagement is essential but insufficient. Environmental education programmes in both regions may successfully transmit knowledge and values, but if students lack the social conditions (belonging, self-efficacy, support) necessary for active caring, behaviour change is unlikely. This theoretical insight is supported by studies indicating that simply increasing environmental awareness in China does not necessarily motivate corresponding low-carbon or conservation behaviours without efficacy and social support (Wang *et al.*, 2025).

By explicitly linking behavioural theories to the comparative contexts of Guizhou and Scotland, this section provides a critical conceptual foundation for understanding how environmental education does or does not lead to transformative outcomes in real-world settings.

2.2 Key Educational Paradigms and Their Trajectories

Environmental education (EE) lies at the heart of this study’s comparative focus, serving as both a pedagogical field and a conceptual umbrella under which different ideologies, methodologies, and political commitments converge. To understand how EE is interpreted and implemented in Guizhou and Scotland, it is essential to trace the definitional evolution, guiding principles, and educational aims that have shaped the field globally.

This section, therefore, explores four interrelated strands. First, it examines the historical emergence and evolving definitions of EE, from early formulations in the late 1960s to internationally recognised frameworks such as the Belgrade Charter and the Tbilisi Declaration. Second, it discusses the structural models of environmental education—particularly the tripartite model of education *about*, *for*, and *through* the environment—and how these models translate into pedagogical approaches. Third, it outlines the connections and tensions between EE and adjacent frameworks such as Education for Sustainable Development (ESD) and Ecopedagogy, highlighting ongoing debates over values, goals, and political orientation. Finally, it reviews empirical research that has investigated how EE has been implemented in practice, offering insights into common successes and limitations.

By clarifying the conceptual terrain of EE, this chapter builds a theoretical foundation for analysing how localised interpretations in Guizhou and Scotland reflect broader global discourses, while also responding to regional educational constraints, cultural traditions, and policy priorities.

2.2.1 Environmental Education : Definition, Approach, and Previous Research

Environmental education (EE) emerged in the late 1960s as a response to increasing global concerns about ecological degradation, pollution, and the loss of the human-nature connection amid rapid urbanisation. Early definitions of EE reflected a growing awareness that environmental problems are not solely scientific or technical issues but also social, political, and moral challenges that require informed and engaged citizens.

One of the earliest formal definitions was offered by Stapp *et al.* (1969), who conceptualised environmental education as a process that enables individuals to become knowledgeable about the biophysical environment and its problems, aware of potential solutions, and motivated to act. This definition emphasised four goals: understanding systems, recognising the role of nature and culture, assuming citizen and governmental responsibility, and fostering environmental concern through active participation.

Environmental education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution.

(Stapp et al., 1969, P.15)

This definition provides four major intentions (Stapp *et al.*, 1969), which are to help individuals acquire: 1). an understanding of “system composition”, 2). an

awareness of the role of the natural and artificial environment in contemporary society, 3). an understanding of the responsibility of both citizens and governments to work towards solving environmental problems, and 4). an attitude of concern for the quality of the biophysical environment and the involvement of citizens in solving biophysical environmental problems. It is worth noting that the keywords in these goals show the philosophy of environmental education in a contemporary context. The goals of current EE can be traced back to this original definition.

This framing laid the groundwork for subsequent international consensus. The Belgrade Charter (UNESCO-UNEP, 1976) expanded on this by identifying EE as a process that cultivates a global population “aware of and concerned about the environment,” equipped with “knowledge, attitudes, motivations, commitments, and skills” to solve problems and prevent new ones. It introduced five widely cited aims of EE: awareness, knowledge, attitudes, skills, and participation.

The system composition in goal 1 includes three parts: human, culture, and biophysical environment (Stapp *et al.*, 1969), where culture refers to a series of social arrangements (such as politics, law, education, etc.) through which humans interact with the biophysical environment. The basic relationship between the components of this system is that humans interact with the biophysical environment through culture to produce or obtain the commodities and services they need (Stapp *et al.*, 1969). This

objective emphasises the ability of humans to strengthen, weaken or maintain the relationships within the system, ultimately to develop and sustain a high-quality system for the promotion of human welfare. Goal 2 emphasises the use and management of natural resources. The resource is defined as those parts of the biophysical environment that are valued by humans as having a direct or potential role in their use (Stapp *et al.*, 1969). Awareness under this goal specifically refers to learning about the characteristics, distribution, status and use of natural resources and further understanding of the social, political, economic and technological processes that use these resources (Stapp *et al.*, 1969). Goal 3 is produced on the basis of Goal 2. It expresses the following viewpoints: firstly, biophysical environmental issues are the result of the interaction between human beings, culture, and the biophysical environment. Pollution, inefficient use of resources, and other issues that have adverse effects represent only one side of the biophysical environment (Stapp *et al.*, 1969). This also indicates that environmental problems are caused by the superposition of complex biological, physical and social factors and are an inevitable result. The way to deal with this result is to hold accountable individuals and governments to weaken the impact of human activities on the entire environmental system. Goal 4 mentions attitude, which means the tendency to action that results from the combination of factual knowledge and motivational emotions (Stapp *et al.*, 1969).

These ideas were reinforced and deepened at the Tbilisi Intergovernmental Conference (1977), which remains a cornerstone of global EE policy. The conference

promoted a holistic, lifelong, and interdisciplinary approach to EE, advocating for its integration into formal and informal education across age groups. It also emphasised the complexity of environmental issues and the need for critical thinking, value-based education, and systems thinking.

Moreover, environmental education is predicated on actions aimed at enhancing societal environmental consciousness and establishing a framework for environmental conservation (Laing, 2004). Environmental education imparts ecological knowledge to individuals while fostering favourable attitudes and behaviours towards the environment (Erten, 2004). Environmental education can be regarded as a form of science education, as it relies on experiential learning, cultivates problem-solving abilities, provides children with practical experience, and emphasises active engagement (Gardner, 2009; Sugg, 2008). Although numerous researchers have articulated definitions of environmental education, these definitions consistently centre on "pursuing change in response to environmental issues, encompassing awareness, attitudes, and behaviours." The educational approaches examined in relation to these definitions have likewise focused on this subject.

The environmental education approach seeks insight into the interconnections between physical and social systems. The environmental education approach emphasises: 1. engaging citizens from diverse demographics; 2. employing critical,

ethical, and creative thinking in the assessment of environmental issues; 3. forming informed judgements regarding these issues; 4. cultivating the skills and dedication to act both autonomously and collaboratively to enhance and preserve the environment; 5. augmenting environmental awareness, leading to positive behavioural changes concerning the environment (Bamberg & Moeser, 2007; Wals, 2014).

The ecological approach to education offers a pedagogical and analytical viewpoint on environmental education, seeking to foster an understanding that encompasses respect for nature, humanity, and diversity (Gronemeyer 1987; Kahn 2010). Environmental education grounded in an ecological pedagogy seeks to impart the principles of life through instruction rooted in ecological principles, subsequently translating these principles into preferred attitudes and behaviours (Gronemeyer 1987; Kahn 2010). The principal objective of ecological pedagogy is to cultivate, by revolutionary teaching and learning, an "earth consciousness" (Bowers, 2004). Ecopedagogical researcher Richard Kahn delineates the three principal objectives of the ecopedagogical movement as: *1. Creating opportunities for the proliferation of ecoliteracy programs, both within school and society. 2. Bridging the gap of praxis between scholars and the public (especially activists) on ecopedagogical interests. 3. Instigating dialogue and self-reflective solidarity across the many groups among the educational left, particularly in light of the existing planetary crisis* (Kahn, 2010).

Environmental education needs to include experiences in problem-solving, decision-making, and engagement, considering ecological, political, economic, social, aesthetic, and ethical dimensions. Environmental education seeks to foster behavioural change to address current environmental issues and prevent the emergence of future ones (Neal & Palmer, 2003). Contemporary interpretations of EE maintain this multi-dimensional emphasis. The curriculum planning at the whole-school and year group levels, along with specialised planning for themes, programmes of study, and tasks relevant to classes, study groups, or individuals, is interconnected and constitutes a crucial aspect of planning across all tiers. An essential element of the planning process is to consider the necessity of comprehending the interconnections among these three components. According to Neal & Palmer (2003), effective environmental education encompasses three interconnected elements:

- *Education about the environment, which focuses on knowledge and awareness;*
- *Education for the environment, which nurtures values and attitudes for responsible action;*
- *Education in or through the environment, which prioritises experiential, place-based learning.*

They argue that effective EE requires an integration of these three strands, rather than treating them as isolated domains. This integrated model recognises that

meaningful behavioural change arises not only from cognitive input, but from lived experience, emotional engagement, and values-based reflection.

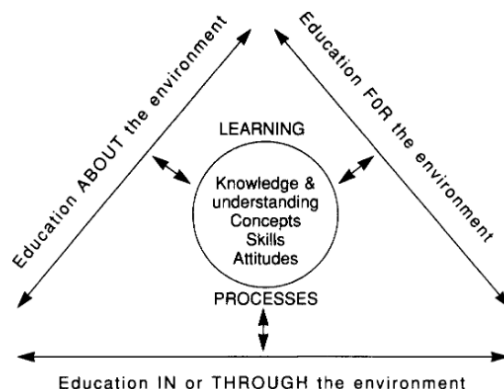


Figure 2.1 Interrelated components of environmental education. (cited in Neal & Palmer, 2003)

The three components are depicted in a more three-dimensional manner in Figure 2.1. The knowledge, concept, and attitudinal components are fundamentally interconnected with the essential content of the three structural parts. This means that learning and experiences should not be isolated within a specific category but should integrate elements from all three areas simultaneously. The goal is to shift from a compartmentalised approach to a more fluid, interconnected model where participants gain benefits across multiple dimensions. The term ‘process’ denotes the continuous methodology of learning via different methods. Figure 5 depicts the tripartite nature of environmental education, highlighting the necessity for a holistic approach that amalgamates information, experience, and action. It posits that environmental education must extend beyond theoretical understanding to encompass active participation and advocacy for sustainable behaviours. Neal & Palmer (2003)

underscore the necessity for individuals engaged with curriculum and learning task planning in environmental education to take into account all of these interconnected components.

Neal and Palmer (2003) argue that environmental education cannot be fully understood without recognising the significance of holism. This holistic orientation was central to the 1977 UNESCO-UNEP Tbilisi Intergovernmental Conference on Environmental Education, which became a pivotal moment in establishing an international framework for the field. The Tbilisi Conference established guiding principles that highlighted the need for a worldwide framework for environmental education. It also emphasised that environmental concerns should be addressed through an integrated approach encompassing social, economic, cultural, and ecological dimensions, rather than being examined in isolation. The holistic approach in education emphasises the development of the whole person, focusing on values, practice, experiential learning, and personal responses to local and global challenges. The fundamental components of this comprehensive strategy, as suggested during the Tbilisi Conference, include (UNESCO-UNEP, 1978):

1. Interconnectedness: Environmental education should acknowledge the interconnectedness of human and natural systems, recognising that ecological, social, and economic factors influence each other.

2. Multi-disciplinary Perspectives: The approach integrates insights from various disciplines, blending scientific, ethical, political, economic, and cultural perspectives to understand and address environmental challenges.

3. Global and Local Awareness: It encourages learners to understand global environmental issues while acknowledging the local contexts in which these issues occur. This promotes both global responsibility and local engagement.

4. Action-Oriented Education: Education should empower individuals to take informed and responsible action for environmental improvement. It calls for moving beyond mere awareness to actively engaging individuals and communities in sustainable practices.

The Tbilisi Conference laid the foundation for modern concepts of environmental education and sustainability, encouraging the global education system to cultivate a deep and comprehensive understanding of the relationship between humanity and the environment. This approach continues to influence environmental education and serves as the basis for achieving long-term sustainable development goals.

In summary, environmental education has developed from early ecological awareness campaigns into a multifaceted pedagogical paradigm that encompasses knowledge, values, participation, and action. Its conceptual evolution—from scientific literacy to critical, experiential, and values-based learning—reflects a growing

recognition of the complexity of environmental problems and the necessity of cross-disciplinary, lifelong, and culturally situated educational responses.

Yet, as this section has shown, EE remains an open and contested field. Its goals, content, and implementation strategies vary across contexts, influenced by political ideologies, educational traditions, and local values. This conceptual flexibility is both a strength and a challenge, and understanding how EE is interpreted and adapted in specific regions—such as Guizhou and Scotland—requires close attention to how global paradigms intersect with local educational practices.

2.2.2 Education for Sustainable Development (ESD): Contested Visions.

As global educational agendas increasingly incorporate the language of sustainability, Education for Sustainable Development (ESD) has come to play a prominent role in shaping environmental education policy and curriculum across diverse national contexts. While ESD is often regarded as an extension or evolution of Environmental Education (EE), it brings with it a broader set of concerns—linking ecological awareness with economic development, social justice, and global citizenship. Given that both Scotland and China (particularly in the context of Guizhou) have officially adopted ESD-related frameworks and vocabulary in their education systems, understanding the theoretical foundations and internal tensions of ESD is essential to

interpreting how environmental education is framed, delivered, and contested in these regions.

Education for Sustainable Development (ESD) has emerged as a dominant global educational paradigm since the 1990s, particularly following the Brundtland Report (World Commission on Environment and Development, 1987) and the 1992 Earth Summit. ESD seeks to integrate environmental, economic, and social concerns into education, promoting learners' capacity to make informed, responsible decisions for a sustainable future (UNESCO, 2005). Unlike traditional Environmental Education (EE), which has often focused on ecological literacy and nature-based experiences, ESD repositions sustainability as a holistic, future-oriented, and action-driven educational mandate, engaging with issues such as equity, poverty, economic growth, and global citizenship (Scott, 2009).

In recent years, international assessments have continued to underscore the alarming scale of ecosystem degradation and its implications for human well-being. The IPBES Global Assessment Report (2019) finds that approximately 1 million species are at risk of extinction, and that three-quarters of the terrestrial environment and two-thirds of the marine environment have been significantly altered by human actions. Ecosystem services—such as pollination, water regulation, and soil fertility—

are increasingly threatened, which directly undermines food security, public health, and climate resilience (IPBES, 2019).

The IPCC Sixth Assessment Synthesis Report (2023) further affirms that human-induced climate change is unequivocally causing biodiversity loss, intensifying extreme weather events, and reducing the capacity of ecosystems to provide essential services. Global warming—currently exceeding 1.1°C above pre-industrial levels—has contributed to irreversible damage in some ecosystems, including coral reefs and Arctic permafrost (IPCC, 2023).

Complementing this, the UNEP’s 2024 Global Environment Outlook highlights persistent challenges such as freshwater stress, land degradation, pollution from plastics and chemicals, and urban air quality deterioration (UNEP, 2024). It warns that environmental fragmentation and delayed policy responses may soon push specific ecosystems past critical tipping points, with cascading effects on human well-being.

As Clayton and Brook (2005) argue, environmental degradation is not solely a matter of ecological change but is deeply rooted in anthropogenic behaviours—particularly those driven by comfort, consumption, and instrumental rationality. This highlights a critical tension at the heart of Education for Sustainable Development (ESD). While ESD seeks to address environmental problems, it often operates within

the same developmentalist logics that have contributed to those problems. This paradox has led environmental philosophers such as Bonnett (2002, 2004) to question the ideological assumptions embedded in the very notion of “development.”

Bonnett (1999) discusses some of the ambiguities and conflicts in the concept of “sustainable development,” exploring some of the problems that arise when the concept of sustainability is combined with the concept of development and attempts to resolve these problems. First, the authors discuss the terminology itself, noting differences in the goals to be maintained by sustainability, with some countries focusing on sustainable economic growth and others concentrating on balancing nature or ecosystems. Bonnett (1999) observed that the concept has been interpreted in various ways, including meeting human needs without compromising those of future generations (Brundtland Commission, 1987), and creating value for new ways of living (Vandeburg, 1987). However, when these meanings have policy implications but their true inner meaning is not made clear, the impression of hypocrisy is left. They may intend to maintain natural ecosystems, but in fact, they are maintaining the conditions for sustained economic growth (Rist, 1997). Bonnett argued that the use of the term is inherently anthropocentric, as in maintaining those natural systems that benefit humans, that the meaning of the term seems to be tacitly assumed, and that the generalisation conceals the tension between debates about anthropocentrism and biocentrism, but also that many writers embrace the non-human values and powers of nature.

Secondly, Bonnett (1999) is also concerned that Smithson (1997) suggested that the main reasons why some non-industrial cultural communities have been able to live in a “more sustainable” way with the environment are due to very low population density and low levels of technological development. Smithson hypothesises that if these communities were to reach the current level of development of Western societies, the attitudes and practices of culture in these communities might also have disastrous consequences for the environment. Bonnett argued that this view also illustrates that the practical challenges of sustainable development are quite different from the conditions of the society itself. He emphasised that solutions to environmental problems have local limitations in terms of history, geography and culture. Furthermore, he expressed the view that every society and culture should ultimately rely on its own cultural resources to innovate solutions. From his perspective, the core element of solving environmental problems is people’s awareness of them. Thus, establishing a correct relationship with nature is the ultimate goal of environmental education. Bonnett (2002, 2004) argues that ESD often reproduces the logic of economic growth under a “green” guise. According to Bonnett, by failing to critically interrogate the very notion of development—rooted in anthropocentrism, linear progress, and technocratic rationality—ESD risks perpetuating the very systems it claims to transform. This critique has led to calls for more critical, culturally sensitive, and locally rooted approaches to sustainability education.

Tensions also emerge around the role of teacher neutrality and student agency in ESD. While ESD aspires to promote democratic, participatory learning (Jickling & Wals, 2008), educators often struggle with value-laden content, conflicting policy agendas, and vague curricular expectations (Rudsberg & Öhman, 2010). The emphasis on action competence and transformative learning may conflict with institutional norms of objectivity, particularly in politically sensitive contexts such as China, where sustainability is also a vehicle for ideological messaging (Zhou & Wong, 2020). In contrast, Scottish policy documents such as *Learning for Sustainability Vision 2030+* promote a rights-based, whole-school approach, but still face challenges in equipping teachers to balance critical thinking with curriculum accountability (Education Scotland, 2019).

In sum, while ESD presents a globally endorsed framework aimed at integrating sustainability into educational practice, its implementation remains deeply entangled in philosophical, cultural, and political tensions. The tensions between anthropocentrism and ecocentrism, between global visions and local realities, and between critical pedagogy and curriculum conformity are not merely theoretical concerns—they significantly shape how environmental education is practised in diverse contexts. In examining how ESD is interpreted and enacted in both Guizhou and Scotland, it

becomes vital to consider how such contested visions manifest in local educational discourse, teacher agency, and student experience.

2.2.3 Ecopedagogy: A Critical Approach to Environmental Education

In response to the limitations and contradictions embedded in mainstream Environmental Education (EE) and Education for Sustainable Development (ESD), ecopedagogy has emerged as a critical alternative that foregrounds the intersection of education, ecological justice, and political transformation. Ecopedagogy, which has its roots in Paulo Freire’s emancipatory educational philosophy, sees environmental degradation as a symptom of larger social, economic, and ideological structures that call for educational change rather than just a scientific or technical issue (Kahn, 2010; Misiaszek, 2011).

Rather than positioning learners as passive recipients of sustainability information or behaviour targets, ecopedagogy conceptualises them as co-constructors of meaning, critically engaging with the world to reshape both their ecological consciousness and socio-political agency. Misiaszek (2016) argues that ecopedagogy challenges the “banking model” of environmental education—where knowledge is deposited by the teacher—and instead promotes dialogical, situated, and problem-posing pedagogies

that interrogate environmental injustice, neoliberal development, and systemic inequality.

Key to ecopedagogy is the concept of *environmental violence*, which refers to how ecological destruction disproportionately affects marginalised communities, both locally and globally (Misiaszek, 2018). This includes the commodification of natural resources, displacement of Indigenous peoples, extractive development practices, and unequal exposure to pollution and climate risks. These injustices are not incidental but systemic, and ecopedagogy insists that education must directly confront these structures of power and privilege.

In this framework, *global citizenship* is not a matter of cultivating abstract empathy or cosmopolitan values, but a call to action that situates learners as political actors capable of resisting environmental injustice and imagining alternative futures (Kahn, 2010). This often involves “curriculum disobedience”—the deliberate reorientation of classroom practices toward student-led inquiry, community-based activism, and decolonial environmental knowledge (Misiaszek, 2020).

In addition to Misiaszek’s foundational work, other scholars have enriched the ecopedagogical discourse. Norat et al. (2016) proposed an integrated categorical system for ecopedagogy based on the Ecopedagogy Charter, identifying principles of

ecoliteracy, solidarity, and a culture of sustainability that critiques neoliberal paradigms. Meanwhile, Okur-Berberoglu's (2021) longitudinal study in Turkey demonstrates that ecopedagogy-based teacher training can lead to sustained changes in green consumer behaviours and ecoliteracy even seven years post-intervention. Moreover, Dunkley (2018) advances the concept of 'space-timeScapes' as essential to ecopedagogical praxis. She argues that transformative environmental education requires not only spatial immersion in local sites but also temporal awareness—understanding historical and future trajectories of place—to foster eco-literacy and relational becoming. Dunkley suggests that connecting participants with both the temporal narratives (e.g., intergenerational oral histories, land-use change) and spatial contexts of their environment enables deeper engagement and grounded environmental citizenship—key objectives of ecopedagogy. These contributions collectively expand ecopedagogy beyond a Freirean template into a multidimensional praxis rooted in justice, locality, and transformative learning.

While rooted in a critical theoretical tradition, ecopedagogy offers valuable lenses for interpreting environmental education practices in both Guizhou and Scotland. In Guizhou, elements of ecopedagogical thinking emerge in efforts to embed ecological values into moral education and traditional cultural narratives—primarily through place-based activities that promote harmony between humans and nature. Although not always articulated in Freirean terms, the emphasis on local ecological identity,

intergenerational ethics, and community involvement reflects ecopedagogical concerns with cultural rootedness and participatory learning.

In Scotland, initiatives such as Learning for Sustainability (LfS) and the widespread adoption of Eco-Schools embody several ecopedagogical principles, including student agency, critical reflection, and whole-school approaches. However, tensions persist between transformative aspirations and institutional constraints—particularly regarding assessment, teacher capacity, and policy coherence. Ecopedagogy helps illuminate these frictions, encouraging a more reflexive stance on how education systems enable or inhibit environmental consciousness and socio-ecological transformation.

Thus, although neither context explicitly adopts ecopedagogy as a formal framework, its underlying ethos—linking justice, place, and pedagogy—resonates within both regions' environmental education practices in contextually specific and culturally embedded ways.

In this study, ecopedagogy is therefore not treated as a formal model that is explicitly adopted in either Guizhou or Scotland, but rather as a critical interpretive lens through which environmental education practices in both contexts can be examined comparatively. It is used to illuminate the extent to which environmental education moves beyond the transmission of environmental knowledge towards questions of

ecological responsibility, social justice, participation, and transformative learning. From this perspective, ecopedagogy informs the analysis of how teachers in Guizhou and Scotland understand, enact, and negotiate environmental education within their respective cultural and institutional settings.

2.3 Pedagogical Implementation: Outdoor and Experiential Learning

The primary objective of outdoor education is to enhance and broaden conventional classroom instruction and to ensure the integration of structured environments with natural settings and significant contextual experiences. In other words, the primary objective of ‘outdoor education’ is to offer significant contextual experiences in both natural and structured settings that enhance and broaden classroom instruction, which is primarily influenced by print and electronic media (Knapp, 1996). Shanely contends that children’s options for unstructured play and consistent engagement with the natural environment are significantly diminished. Outdoor education programmes serve as instruments to facilitate children’s engagement with the natural environment. Outdoor education is an approach to learning that emphasises curriculum, behaviour, production, conservation, and survival (Shanely, 2006). Nature offers children various materials for outdoor education. Children can acquire substantial knowledge through immersion in nature, using all their senses, and exploring and observing their surroundings (Jena & Behera, 2017).

A multitude of studies (Chawla, 2020; Palmer *et al.*, 1998; Thompson *et al.*, 2008) have emphasised the essential impact of outdoor experiences in the development of cognition, emotion, and actions. Researchers endorse the capacity of outdoor experiences to inspire individuals to engage in environmental stewardship. Researchers have emphasised the significance of educational programs that offer young students the opportunity to engage with the outdoor environment (Cincera, 2023). Outdoor Environmental Education Programs (OEEP) are commonly employed in Environmental Education. Numerous studies have substantiated the advantages of OEEP: positively influencing students' engagement with nature, fostering environmental concern, and altering students' perceptions towards nature and wildlife.

Sandell and Ohman (2012) contend that outdoor experiences include instrumental value; they acknowledge outdoor learning as an effective method for attaining several objectives, including physical and mental well-being, social cohesion, and an appreciation of nature. They assert that outdoor encounters have inherent value or enhance the quality of life—a sense of connection to nature and humility towards the diverse non-human elements encountered in the outdoors. The values presented are intrinsically connected to the outdoor experience and are difficult to locate within the surroundings and lifestyle of contemporary urban culture. Jose *et al.* (2016) observed that the majority of environmental education is fundamentally experiential, as environmental educators aim to foster a personal connection between learners and

nature. When students engage with their local environment, they cultivate a deeper connection with nature (Meichtry & Smith, 2007) and foster a desire to preserve it (Kossack & Bogner, 2012; Shepardson *et al.*, 2007). Emotional, physical, and social connections during outdoor activities can enhance memory and the acquisition of new knowledge pertinent to prior experiences (Blatt & Patrick, 2014).

Dillon *et al.* (2006) conducted a review of outdoor learning research from 1993 to 2003 and identified substantial evidence of the beneficial effects of outdoor learning on children. Emmons (1997) investigated a five-day field program in Belize, revealing that students' learning was enhanced by their collective and direct engagement with the environment. Additionally, the teacher's enthusiasm for the forest setting served as a role model, further improving the students' educational experience. This positive engagement with the forest environment also provided a model for the children and enhanced their learning experience. Emmons (1997) contends that long-term programs are more efficacious than short-term ones, noting that the duration students engage with the natural environment (about five days) significantly reduces adverse impressions of the environment, especially anxiety. Short-term environmental education programs may lack efficacy. Eaton (2000) discovered that outdoor learning experiences enhanced cognitive skills more than traditional classroom instruction.

In 2018, Frankfurt undertook an empirical study on an extracurricular outdoor environmental education program titled 'Think Global, Act Local -We Protect Our Environment'. The instructional program comprises four modules: 'Freshwater Ecosystems', 'Forest Ecosystems', 'Biocaching', and 'Culture and Conservation'. The Freshwater Ecosystems module acquaints students with a variety of freshwater environments, including rivers, streams, and wetlands, while providing them with the information and skills essential for research and protection of these ecosystems. The Freshwater Ecosystems module acquaints students with a variety of freshwater environments, including rivers, streams, and wetlands, while equipping them with the knowledge and skills essential for the research and conservation of freshwater ecosystems. The 'Forest Ecosystems' module acquaints pupils with various kinds of forests found worldwide.

Students learnt about trophic webs, photosynthesis, nitrogen cycling, different forest strata, and the environmental risks that forests confront. The curriculum focuses not only on the practical acquisition of ecological knowledge but also stimulates critical discussion on contemporary concerns such as the relationship between trees and air pollution and the implications of global climate change. By combining the well-liked geocaching activity with species identification, the "Biological Treasure Hiding" module allows students to become acquainted with a variety of tree and insect species, comprehend the morphology of insects, and learn about ecological processes

like pollution reduction, nutrient cycling, and soil enrichment. Students' emotional connection to the ecology was strengthened by the joy that came with using GPS devices to navigate forests.

The “Culture and Conservation” program aims to provide students with theoretical understanding and practical skills in conservation. It investigates environmental change mechanisms and analyses the correlation between natural heritage and individual accountability. Students are introduced to actionable techniques for environmental stewardship through themes such as climate change, renewable energy, and sustainable agriculture. Student engagement in environmental management is not framed as an isolated goal, but rather as an essential manifestation of their enhanced environmental attitudes, knowledge, and affinity for nature. According to Frankfurt (2018), such interaction effectively reinforces students' learning goals by enabling them to apply information, articulate beliefs, and cultivate a personal connection with nature through action. The study emphasises the significance of determining ideal age cohorts, intervention durations, and additional contextual elements that affect the development of children's environmental awareness and behaviours. It also affirms that even short but deep encounters in nature—such as a single day spent outdoors—can enhance students' perceptions and cultivate significant human-nature ties.

This comprehensive empirical study demonstrates how effectively structured Outdoor Environmental Education Programs (OEEPs) may seamlessly blend knowledge acquisition, emotional involvement, and participatory action. The programme exhibits a pedagogical strategy that promotes cognitive and affective development by providing varied topic modules and integrating experiential learning with critical environmental discourse. This study is particularly pertinent as it highlights how outdoor and place-based methodologies can enhance students' environmental comprehension and foster enduring ecological engagement. This model underscores the need for tailoring outdoor experiential practices to specific locales such as Guizhou and Scotland, where educators encounter structural limitations yet still have access to distinctive cultural and biological assets.

In summary, this section has explored the theoretical underpinnings and empirical examples of outdoor and experiential environmental education, highlighting its potential to foster emotional engagement, place attachment, and pro-environmental behaviour. The reviewed literature demonstrates that learning beyond the classroom, particularly in nature-rich settings, can strengthen students' cognitive, emotional, and behavioural dimensions of environmental literacy. However, it also underscores the persistent structural barriers—such as safety concerns, limited resources, and curricular constraints—that shape how such pedagogies are implemented.

This analysis is particularly pertinent to the present study, which investigates the implementation of environmental education within two unique cultural and ecological contexts: Guizhou, China, and Scotland. Both regions provide rich natural surroundings and cultural narratives conducive to substantial outdoor learning; nevertheless, they encounter distinct institutional and physical constraints. This study aims to comprehend how environmental significances and actions are collaboratively formed through place-based experiences by contextualising outdoor and experiential pedagogy within the wider educational ecologies of these regions, while also examining how educational limitations and opportunities influence these processes.

2.4 Comparative Pathways: Environmental Education in China and Scotland

Building upon the preceding exploration of pedagogical approaches in environmental education—particularly outdoor and experiential learning—this section turns to the comparative contextualisation of environmental education in China and Scotland. While both regions demonstrate increasing institutional interest in embedding sustainability and ecological awareness into educational systems, the socio-political trajectories, cultural traditions, and pedagogical infrastructures that shape these developments differ markedly. This section provides an overview of the two respective national pathways, situating environmental education within broader educational reforms, ideological paradigms, and cultural narratives.

By examining China's transition from exam-oriented frameworks to holistic environmental discourses and Scotland's longstanding integration of sustainability within curriculum policy and school culture, the analysis sets the foundation for the empirical comparison in the subsequent chapters. Highlighting both convergence and divergence, this section aims to foreground how environmental education is not simply a pedagogical issue but a reflection of deeper cultural and systemic orientations.

2.4.1 The Chinese Path: From Exam-Oriented to Holistic EE

In the last fifty years, China has undergone the most significant rural-urban migration in global history (Zeng, 2019; Zhang & Song, 2003). In 2017, over 58.5% of China's population resided in urban regions. This migration is primarily driven by economic prosperity and unprecedented rapid urbanisation. Environmental contamination is a prevalent outcome of industry and urbanisation (Straf *et al.*, 2013). Due to varying levels of industrialisation and urbanisation, perceptions of environmental pollution and issues in environmental control fluctuate significantly among countries. During the initial phases of industrialisation, individuals are typically oblivious or less apprehensive about the detrimental effects of environmental pollution on human health and ecosystems. During this period, individuals typically prioritised sectors that fostered local economic growth at the village level by generating

employment opportunities and alleviating overall poverty. Like many developed nations during the initial phases of industrialisation and urbanisation, China's swift economic expansion has resulted in significant pollution emissions and environmental degradation (Economy, 2004; Lin *et al.*, 2010). At this stage of China's development, there is increasing recognition that serious pollution and ecological degradation pose significant challenges to sustainable development. The repercussions of industrialisation and urbanisation, such as ecosystem degradation, natural resource depletion, and human health deterioration, can profoundly affect the economy. Daly contended as early as 1997 that the economic ramifications of extensive harm to human health and the environment would surpass the advantages of GDP growth. In this regard, realising the urgency of environmental issues has emerged as a paramount purpose in advancing environmental protection in China, guiding Chinese residents to comprehend that environmental education is the principal method of distributing environmental science. The previous section delineates the inception of environmental education in China. This part will concentrate on the implementation and adjustments in environmental education in China.

For a review of the path of environmental education in China, it is essential first to provide a broad understanding of the Chinese education system. Firstly, it is exam-oriented education, emphasising intellectual advancement. Curricula are designed to facilitate exam preparation and subsequent academic pursuits. Test scores and

promotion rates serve as evaluative measures. The selection of talent through examination is the fundamental principle of educational assessment. The crucial embodiment of exam-oriented education is the National College Entrance Examination (Gaokao in Chinese). The Gaokao is a standardised assessment conducted annually in June. This test is crucial for choosing highly qualified pupils for university admission and is among the most significant assessments in China. Since the inception of the Gaokao in 1952, it has become the principal avenue for higher education, resulting in intense competition due to the limited availability of educational resources in China, while the demand for superior education has surged significantly (Du, 2007).

The leading position of Gaokao has facilitated the transmission of knowledge from professors to students and has guaranteed the continuity of knowledge within the educational system. Variations among individuals can be noticed in the analysis of examination outcomes. Examinations can assess and enhance student learning, foster competitiveness among individuals, and subtly reinforce disciplinary order within educational institutions. Education and examination play a crucial role in cultivating self-discipline and fostering a disciplined society (Huang, 2020). From a social justice standpoint, the Gaokao is founded on principles of equity. It offers equitable access to higher education resources for students. Researchers have asserted that the Gaokao provides potential chances to individuals from marginalised groups, perhaps diminishing social stratification and enhancing their quality of life (Zhang, 2016). The

intense competitiveness of the Gaokao has significantly influenced the establishment and evolution of test-oriented education in China. Du (2007) asserts that the Gaokao aims to detect and nurture competent individuals systematically. The Gaokao policy has significance for the nation's stability and prosperity. The primary objective for students is to succeed in the Gaokao to get better opportunities for higher education (Zhang, 2016). Students become immersed in exam preparation, which intensifies the development of exam-centric education. Furthermore, university enrolment rankings serve as a significant reference for evaluating the quality of educational institutions (Lu, Tang & Luo, 2007). Consequently, the fundamental concept of 'preparing for Gaokao' has, to a certain degree, facilitated the development of test-oriented education.

Nevertheless, criticism of exam-oriented education has consistently persisted. It has been criticised for focusing solely on a limited number of students, prioritising knowledge for examinations, emphasising the uniqueness of this knowledge, and neglecting educational principles and students' physical and mental development, thereby contributing to incomplete and abnormal student development (Wang, 2001). Regarding educational methodologies, 'examination education' overlooks students' subjective initiative, prioritises knowledge transfer, neglects the development of critical thinking and practical skills, and promotes rote learning and memorisation, so imposing significant responsibilities on students. However, another educational model has progressively arisen alongside exam-oriented education: quality-oriented education. In

June 1994, the Central Committee and the State Council of the CPC held the Second National Education Work Conference, during which they emphasised the necessity of shifting basic education from an exam-oriented approach to a focus on quality-oriented education. The theoretical underpinnings have been reinforced by enhanced research and integration of pertinent areas and theories. Researchers have enhanced the theoretical implications of quality education by referencing various theories, including the knowledge economy, lifelong learning, constructivist learning, humanistic learning, and multiple intelligences. They have concluded that quality education must not only be inclusive and aimed at improving the overall quality of all students but also foster student subjectivity and emphasise their capabilities and potential. Quality-oriented education is acknowledged to not only target all students and enhance their overall quality but also to foster their individuality, emphasise their lifelong growth, and nurture their character. Quality-oriented education unequivocally signifies the whole development of persons and their personalities. It embodies the practical application of comprehensive developmental education, facilitating the realisation of holistic growth, while personalised development optimises the quality and individuality of each student across multiple structured dimensions.

The Chinese Ministry of Education (2001) contends that assessment should not exclusively emphasise students' academic performance, but rather address their needs, recognise their diverse potentials, and facilitate their self-awareness development. The

Ministry of Education (2002) released a comprehensive circular outlining six fundamental developmental objectives for students: ethics and virtues, citizenship, learning, communication and collaboration skills, health and well-being, and aesthetic performance, in addition to academic objectives. This circular is significant as the six objectives establish a fundamental framework for evaluating the overall quality of education. In 2004, the Ministry of Education provided instructions on the reform of school enrolment, which signified the official use of the term comprehensive quality evaluation in policy papers. The guide advised that (1) the content of the comprehensive quality assessment adhere to the six fundamental development objectives established in 2002, while allowing local governments and schools the discretion to contextualise them; (2) the assessment prioritise student self- and peer-evaluation; and (3) the assessment outcomes encompass feedback and grades, which will serve as significant references for students seeking admission to upper secondary schools. In 2008, the Ministry of Education (MOE) promulgated standards that encompassed a comprehensive quality assessment for higher education admissions, extending the evaluation to upper secondary pupils. Subsequently, all provinces, autonomous areas, and municipalities in China have systematically implemented comprehensive quality assessment systems for primary and secondary education.

The shift in educational paradigms has created novel prospects for environmental education. Tian *et al.* (2015) have examined the fundamental development of

environmental education in China since 1973. The survey indicated two key components of environmental education in China. Government staff members constituted one of the primary initial audiences for environmental education in China. During the Third National Conference on Environmental Protection (1989), it was emphasised that communication and education regarding environmental protection must be enhanced, and the environmental awareness of government officials across all levels should be elevated. The conference underscored that environmental education must prioritise the training of government officials across all tiers. The secondary element of environmental education focused on the training of professionals and specialists in environmental protection. At that time, China urgently required specialists in pertinent environmental disciplines and domains. Consequently, education on environmental conservation emerged as a primary strategy for environmental protection in China.

Tian *et al.* (2015) contend that there are two primary modalities of environmental education in China. The objective is to educate the public about the dangers posed by environmental issues and to enhance awareness of these matters. This is executed through various media publications, encompassing newspapers, television, and online communication. The second approach is to use educational institutions as the principal platform for imparting environmental knowledge to pupils, encompassing kindergartens, primary schools, secondary schools, and specialist colleges. Students

enrolled in tertiary education and research institutions may select pertinent subjects for their specialisations. This category focuses on enhancing professional expertise and competencies in environmental protection. Tien *et al.* (2015) assert that environmental education is a comprehensive concept, with the majority of programs in China focused on environmental protection and sustainability. They emphasise that daily life is crucial for advancing environmental education. Rather than differentiating between environmental knowledge, law, and ethics, it is more effective to incorporate the knowledge, methods, and objectives of environmental education, thereby transforming it into a lifestyle for people in general. Since 1973, China has achieved significant advancements in electrical engineering. During the United Nations Decade of Education for Sustainable Development (UNDESD), China has undergone three significant transformations: transitioning from the international concept of Education for Sustainable Development (ESD) to a Chinese interpretation, shifting from intervention and action research to the formulation of public policy, and evolving from innovation within schools to fostering partnerships within school communities.

Lee & Tilbury (1998) demonstrated that curriculum dissemination in China is predominantly ‘top-down’ and centrally governed by the State Education Commission. In China, the frameworks for primary and secondary school curricula are derived from the Syllabus, which outlines the principal subjects to be instructed in schools and the suggested distribution of instructional time (measured in weekly class hours) for each

subject. This has led to a guaranteed consistency of the curriculum (a standardised syllabus nationwide), but minimal local and school innovation. Zhu (1995a) believed that China's examination system would restrict and impede the advancement of environmental education, asserting that examinations are vital for youth. Hao (1996) elucidated that those who complete higher education may secure lucrative employment and attain an elevated social position. Individuals' futures hinge on how well they perform in examinations. Zhu (1995b) noted that schools are being urged to prioritise GCE courses, thereby marginalising non-GCE subjects such as environmental education. Even when environmental education is incorporated, it is typically relegated to a secondary status and only garners attention after the examination program has been established. Wong (1995) reached a similar finding that students' achievement in public examinations significantly influences the school's social status. In the conflict between fulfilling public examination requirements and integrating environmental education, the majority of educators favoured the former, resulting in environmental education within the curriculum being largely superficial rather than a systematic and widely acknowledged practice.

In this study, I argue that China's engagement with Western EE and ESD frameworks should not involve simple adoption, but should be understood as a process of contextual adaptation through which culturally grounded forms of EE and ESD can be developed. Incorporating Confucian philosophical traditions and essential principles

such as harmony, sustainable relationships with the environment, and intergenerational communication and support is crucial in this endeavour (Lin & Ross, 2005). In 2003, China's Ministry of Education (MOE) issued new guidelines, formulated in partnership with WWF-China, advocating for the incorporation of environmental information, attitudes, and values into the mandatory education curriculum. The Ministry of Education characterised these recommendations as fundamental to the National Sustainable Development Strategy, deeming them potentially impactful for the global community, which led to their receipt of WWF-China's 'Gift to the Earth' award (Fang, 2003). Five vital environmental reform trends are central to the formulation of these guidelines: (1) the expansion and commercialisation of post-secondary education, (2) the incorporation of environmental training and research within teacher education programs and institutions, (3) the creation of "integrated" textbooks and pedagogical approaches, (4) the rise of environmental non-governmental organisation (NGO) activism, and (5) the establishment of state-supported "green schools."

In the same year, the Chinese government introduced the Notion of Scientific Development (NSD), which defines China's perspective on sustainable development. In summary, NSD formulated the development of ecological civilisation (Lin & Ross, 2005). Consequently, NSD is directed towards ecological civilisation and innovative lifestyles consisting of EE. To execute the national strategy for sustainable development, the Ministry of Education (MOE) released two documents in 2003: a Special

Curriculum for Environmental Education in Primary and Secondary Schools, and an Implementation Guidelines on Environmental Education for Primary and Secondary Schools. These two documents directed school boards and educational institutions to commence in the spring of 2003: (1) offer courses on EE as an independent subject; (2) fully integrate EE into school schedules; (3) offer teacher training, and (4) conduct research on EE pedagogies. These two policy documents officially stipulated the formal integration of EE into primary and secondary schools. Since then, ESD has increasingly been positioned as an integral component of basic education reform in China.

Later, a system of environmental education with distinct Chinese elements progressively emerged. Starting, it includes a modification in the teaching method. The osmosis education model has been employed in environmental education since 2001, when the Ministry of Education released the [Full-time Compulsory Education Curriculum Standards for Various Disciplines (Experimental Draft)], mandating that the concept of environmental education be prominently and explicitly integrated into the teaching content and curriculum design of each discipline. The research group (2006) pointed out that the most significant drawbacks of ‘exam-oriented education’ are the excessive focus on theoretical knowledge, particularly via external indoctrination, and the undue emphasis on test-taking abilities. Teaching methods predominantly involve mechanical training, such as repeating homework and test

questions, while significantly neglecting students' emotional, affective, and personality development, as well as their self-awareness and holistic skill enhancement, preventing them from designing their futures. In this condition, learning transforms into a burden of 'service' and 'duty' for 'others', making it challenging to evoke motivation and interest in the educational process. Consequently, several children and adolescents have developed a defiant attitude towards education, educational institutions, instructors, and parental figures. Focussing solely on promotion as a goal is shortsighted and transient, as it not only constrains students' potential and hinders their development but also renders studying "without understanding its purpose" frequently inefficient or even counterproductive.

China's environmental education is fundamentally dependent on basic education; thus, the transformation in educational methodology has created new developmental chances for environmental education. The core of quality-oriented education lies in reinstating the essential value and worth of education, specifically the cultivation of students' healthy mentality and the advancement of their holistic development. Quality-oriented education necessitates that the curriculum content is deeply connected to students' developmental experiences and real-life contexts, to enhance academic achievement and foster a genuine enjoyment of learning. Quality-oriented education seeks to improve human life by fostering a spirit of curiosity and creative thinking, while ensuring adequate time and space for the development of students' talents and

potential. It allows pupils to engage with the profundity and elegance of intellect and creativity in education. This enables the complete activation of students' potential, supports their self-confidence and entrepreneurial spirit, transforming learning into a lifelong pursuit and conscious endeavour, thereby promoting the holistic, efficient, and sustainable growth of students. The advancement of children will necessitate and foster the development of teachers.

Environmental educators have been imparting environmentally pertinent ethics to educators inside the formal education system, particularly to researchers in educational institutions, during the progressive transition from exam-oriented education to quality-oriented education. Environmental educators frequently coordinate a sequence of student activities to honour significant environmental occasions, like World Water Day, International Earth Day, and Tree Planting Day. Teachers and children at Shandong Primary School collaborated to compose a letter to a Qingdao (one of the cities in Shandong Province) reporter on New Year's Eve 1999. The letter urged the inhabitants of Qingdao to convey their wishes through various means. They were requested to refrain from sending greeting cards to 'preserve a tree' (Qing, 2004). Bian (2015) stated that educators ought to utilise the resources found in textbooks. In language classes, students are instructed to observe wildlife, nurture plants, and comprehend the significance of ecological balance by integrating textbook knowledge. Bian (2015) posited that educators dig into the textbook material related to environmental and

animal conservation, thereafter expanding upon this knowledge during lectures to encourage discussions on environmental issues and enhance students' environmental consciousness. Tian (2004) acknowledges that Sustainable development broadens the research parameters of environmental education. In developed countries like the UK, ESD is supplanting the term environmental education. He stated that sustainable development is founded on environmental education, prioritising experimental over theoretical aspects of environmental education. China's education system is experiencing a shift that presents a significant potential for the integration of Education for Sustainable Development (ESD) within the current educational framework.

Although China's educational framework has evolved, academic pressure on students, teachers, and parents remains substantial. Despite the progressive transition towards quality-oriented education, the Gaokao system, as a central component of exam-oriented education, continues to shape the Chinese educational framework and is likely to remain influential for an extended period. The phrase "education for sustainable development" was incorporated into the Thirteenth Five-Year Plan for National Education Development under the section on "strengthening capacity building for ecological civilisation" and was redefined in relation to frugality, conservation, environmental consciousness, and sustainable development principles (State Council of the People's Republic of China, 2017; Tian *et al.*, 2024). At the 2018 National Education Conference, Chinese officials advocated for the creation of a holistic 'five-

education' talent development system: moral education, intellectual education, physical education, aesthetic education, and labour education. Comprehensive development has emerged as the foundation of talent cultivation in the contemporary era. To advance the 'five educations', the Outline for Strengthening and Improving School Physical Education in the New Era was issued in October 2020, advocating for the thorough enhancement of physical education, the establishment of a complete cadre of physical education instructors, and the intensification of reforms. In the meantime, China has implemented the Outline on Strengthening and Improving School Aesthetic Education in Schools, which seeks to incorporate aesthetic education across the educational system and to elevate students' aesthetic sensibility and humanistic attributes.

Within the contemporary framework of ecological civilisation, China's environmental education promotes diverse participation and collaborative management among schools, governments, and public organisations, while the curriculum system is becoming increasingly varied and pragmatic. Against this backdrop, the curriculum system in China is increasingly moving towards integration, seeking to move beyond earlier fragmented and prescriptive curriculum approaches and to establish a more process-oriented, relational, and coherent framework. This shift is important not only for transforming the theory and practice of environmental education curricula, but also for advancing environmental education more deeply within the Chinese context. Tian *et al.* (2024) identified that eco-education encompasses eco-civilisation education, eco-

ethics education, and eco-art education. Eco-art education addresses ecological imbalance while enhancing students' humanistic literacy and artistic skills across all disciplines. The increasing necessity to examine the relationship between humanity and nature has intensified interest in eco-education, making it a focal point of research in education for sustainable development. In this context, eco-education is perceived not only as the integration of ecological consciousness within education but also as a method for cultivating well-rounded graduates.

In summary, the evolution of environmental education (EE) in China has experienced a multifaceted shift, transitioning from marginalisation to gradual institutionalisation. Initially, the exam-centric education system prevailed in educational practices, emphasising standardised assessments and scholastic success. This presented considerable obstacles to the incorporation of EE, not only with curricular allocation and temporal constraints but also in its value framework, which frequently contradicted the critical thinking, experiential involvement, and interdisciplinary methodology promoted by EE. As “quality-oriented education” reforms progressed, environmental subjects gradually infiltrated the curriculum via moral education and integrated practical exercises. Significant policy milestones, including the 2001 Outline for Curriculum Reform of Basic Education, the 2003 Guidelines for Environmental Education in Primary and Secondary Schools, and the 2017 Overall Plan for the Reform of the Ecological Civilisation System, signify a

transformation in the state's perspective—from perceiving Environmental Education as a mere supplementary element to acknowledging it as a fundamental and value-infused aspect of education.

Furthermore, environmental education in China transcends a mere instructional framework or knowledge system; it is intricately intertwined with national government discourse. The notion of ecological civilisation, as a government-driven discourse, prioritises sustainable development as a strategic national imperative. It derives cultural legitimacy from Confucian principles such as *tianren heyi* (unity of heaven and humanity) and *he* (harmony), integrating them into curriculum policy via top-down institutional procedures. This institutional framework illustrates China's robust capacity for policy integration and cultural alignment at the macro level, while also revealing practical implementation issues at the local level, including examination pressure, disparate resource allocation, and differing teacher interpretations.

This developing trajectory establishes the foundation for comparative analysis. In comparison to Scotland's more decentralised, teacher-led, and student-experience-focused model, China's approach is more policy-oriented and culturally integrated, strongly dependent on governmental efforts and discursive legitimacy. This distinctive amalgamation of structural and cultural attributes will function as a pivotal reference for comprehending the disparities in EE implementation between China and Scotland.

2.4.2 The Scottish Path: Curriculum Integration and Learning for Sustainability

The development of environmental education in Scotland can be traced back to the 1970s. Following the 1972 United Nations Conference on the Human Environment in Stockholm, global concern over environmental pollution, resource depletion, and ecological degradation began to intensify, contributing to the emergence of a wider environmental consciousness. This international momentum encouraged Scottish educators to explore environment-related themes within their teaching practices (Higgins, 2003). However, Scotland's environmental education did not emerge from international policy discourse alone. Even before this period, Scottish educators had accumulated substantial experience in outdoor education, a tradition that connected physical activity, environmental awareness, personal development, and learning beyond the classroom (Higgins, 2002). As discussed in Section 2.3, outdoor and experiential learning can support children's cognitive, emotional, and behavioural engagement with the natural environment (Chawla, 2020; Palmer *et al.*, 1998; Thompson *et al.*, 2008). In the Scottish context, this tradition provided an important pedagogical foundation for later developments in environmental education and Learning for Sustainability.

Numerous studies have substantiated the advantages of OEEP: positively influencing students' engagement with nature, fostering environmental concern, and altering students' perceptions towards nature and wildlife. Sandell and Ohman (2012) contend that outdoor experiences include instrumental value; they acknowledge outdoor learning as an effective method for attaining several objectives, including physical and mental well-being, social cohesion, and an appreciation of nature. They assert that outdoor encounters have inherent value or enhance the quality of life—a sense of connection to nature and humility towards the diverse non-human elements encountered in the outdoors. The values presented are intrinsically connected to the outdoor experience and are difficult to locate within the surroundings and lifestyle of contemporary urban culture. Jose *et al.* (2016) observed that the majority of environmental education is fundamentally experiential, as environmental educators aim to foster a personal connection between learners and nature. When students engage with their local environment, they cultivate a deeper connection with nature (Meichtry & Smith, 2007) and foster a desire to preserve it (Kossack & Bogner, 2012; Shepardson *et al.*, 2007). Emotional, physical, and social connections during outdoor activities can enhance memory and the acquisition of new knowledge pertinent to prior experiences (Blatt & Patrick, 2014).

Between the 1970s and 1980s, many primary schools in Scotland actively implemented nature-based learning initiatives. These programs typically focused on

areas such as plant observation and local wildlife identification, where students used simple field guides to recognise various plants, insects, and bird species—fostering an early awareness of and respect for biodiversity. Another common approach involved water and soil investigation projects, in which students collected samples from local rivers, ponds, and gardens to test basic physical and chemical properties such as pH, moisture content, and levels of pollution—thereby promoting an understanding of environmental health and human impact. Schools also developed gardening initiatives and created “eco-corners,” encouraging pupils to plant vegetables, build insect hotels, or install bird feeding stations, all aimed at cultivating a sense of environmental stewardship and responsibility.

Of particular significance was the role of the Scottish Field Studies Association (later incorporated into the Field Studies Council Scotland), which emerged as a key driver of outdoor learning during the late 1970s and into the 1980s. The organisation facilitated a wide range of field-based environmental education programs and professional development opportunities for teachers. Advocating the belief that “education should not be confined to the four walls of the classroom,” they emphasised experiential learning as a powerful means of shaping students’ environmental understanding, emotional engagement, and propensity for action (Field Studies Council, 1983).

This “learning beyond the classroom” philosophy began to influence both curricular goals and assessment frameworks at the time. Educators and schools started experimenting with interdisciplinary “ecological theme units,” integrating subjects such as language arts, mathematics, and science around central environmental topics like “water,” “forests,” or “pollution.” Teachers increasingly shifted their focus from rote memorisation to process-based learning, encouraging students to move from observation to explanation, and began to emphasise the interconnectedness of humans and nature rather than presenting flora and fauna as isolated facts.

Unlike traditional classroom-based instructional models, outdoor education emphasises direct engagement, problem-based learning, and interdisciplinary integration. It enables students to observe, analyse, and reflect on environmental issues within real-world contexts, thereby fostering a deeper and more enduring sense of environmental responsibility (Higgins, 2003). Outdoor education thus provided a practical foundation for the curricular integration of environmental education. It served as a precursor to the *Curriculum for Excellence* (2004), which formally incorporated the “Learning for Sustainability” policy framework. Within this framework, outdoor learning is recognised as one of the three core pillars of environmental education—alongside global citizenship education and education for sustainable development—collectively forming the green foundation of Scotland’s education system (Ward *et al.*, 2025).

From the 1990s to the 2000s, environmental education in Scotland transitioned from being predominantly extracurricular or thematic to being integrated into the formal curriculum. This transition was propelled by both changing policy frameworks and progress in educational research.

In summary, the development of environmental education in Scotland has been deeply influenced by its longstanding tradition of outdoor learning. As the literature suggests, outdoor education has served not only as a method of contextualising ecological knowledge but also as a medium for fostering emotional connection, behavioural engagement, and interdisciplinary inquiry. It has laid the practical groundwork for broader environmental education policies, including the integration of Learning for Sustainability (LfS) into the Curriculum for Excellence. However, while these curricular frameworks and pedagogical philosophies are well established in theory, less attention has been paid to how teachers interpret, negotiate, and implement these ideals in everyday classroom and school settings. This research seeks to address that gap by examining how Scottish primary teachers understand and operationalise environmental education—particularly through the lens of outdoor learning, curricular autonomy, and cross-subject integration. By foregrounding teachers’ voices and lived experiences, this research explores how national policies such as LfS are translated into practice, how tensions are navigated, and how environmental values are embedded or

resisted in different school contexts. This approach bridges the historical and policy-oriented literature with empirical classroom realities, highlighting the critical role of teachers as both implementers and interpreters of environmental education.

The UNESCO Tbilisi Declaration (1977) and Agenda 21 from the 1992 Rio Earth Summit emphasised the pivotal importance of education in attaining sustainable development. The international documents compelled both the UK and Scottish governments to acknowledge that environmental education extends beyond nature conservation to include larger socio-economic, political, and ethical aspects.

In the early 1990s, prompted by Chapter 36 of the United Nations' Agenda 21 from the Rio Earth Summit, which called upon all nations to develop national strategies for environmental education, Scotland emerged as one of the early respondents. As early as 1990, a government-initiated Working Group on Environmental Education was established to begin drafting such a strategy (Smyth, 1996). Scotland's distinct education system—separate from that of the rest of the UK—and its autonomous environmental governance provided a unique foundation for this undertaking. The intellectual legacy of Sir Patrick Geddes, regarded as a pioneer of environmental education, alongside the influential Gilbert Report of 1974, further reinforced Scotland's commitment. The strategy report was officially submitted in 1993 and

subsequently endorsed by the Secretary of State in 1995, forming the basis of future environmental education policy (Smyth, 1996).

The development of the strategy was marked by a highly participatory and interdisciplinary approach. The Working Group, comprising 19 members from across the educational, governmental, and environmental sectors, employed a wide-ranging consultation process—including surveys, stakeholder interviews, and thematic workshops (Smyth, 1996). A distinctive methodological feature was the formation of eight sub-groups organised not by institutional type but by learning contexts (e.g., home, school, community, workplace, leisure), reflecting a comprehensive, lifelong learning perspective. The strategy intentionally broadened the conventional definitions of both “environment” and “education,” framing the environment as a complex interplay of natural, social, political, cultural, and economic systems, and education as an inclusive, continuous process extending beyond formal schooling. Its central objective was to foster environmental awareness, knowledge, and responsibility across society, encouraging sustainable lifestyles and embedding environmental learning within public policy, community engagement, and individual behavioural change.

Following the official endorsement of the Scottish Environmental Education Strategy in 1995, a series of developments unfolded across both public and private sectors, indicating a broad acceptance and mobilisation of its principles (Smyth, 1996).

Numerous institutions began reassessing their educational roles: for instance, Scottish Natural Heritage (SNH) launched its own Education Initiative based on the strategy, while the Forestry Commission introduced dedicated educational officers and forest-based learning programs. At the community level, initiatives such as the Vision 21 Citizens' Environmental Initiative and local sustainability seminars reflected growing grassroots engagement. In schools, the national 5–14 curriculum reform integrated environmental studies as a core area, offering opportunities for cross-curricular learning. Collaborative platforms, such as the Common Agenda Workshops, fostered dialogue between formal education stakeholders and external organisations. Meanwhile, teacher training institutions developed environment-focused modules, and environmental audits of school grounds became more widespread through programs like “Grounds for Learning” and SEEC’s Stewardship Awards (Smyth, 1996).

Despite these positive trajectories, several significant challenges persisted. The integration of environmental education into the secondary school curriculum remained uneven, particularly in early secondary years (ages 12–14), which continued to be dominated by rigid disciplinary structures (Smyth, 1996). Cross-curricular themes, including environmental education, were often relegated to non-mandatory guidance documents, limiting their reach to already motivated educators. Additionally, the broader educational reform process suffered from inadequate resource allocation, with local authorities and teacher unions expressing concern over the lack of staff and

funding (Smyth, 1996). This resource gap made implementation highly dependent on individual enthusiasm rather than systemic support. Without vigorous policy enforcement and consistent funding, the long-term sustainability of the strategy risked dilution, and much of its progress continued to rely on voluntary efforts and isolated initiatives rather than fully integrated institutional change.

The development of Sustainable Development Education (ESD) in Scottish schools can be broadly understood in three phases: emergence, dormancy, and re-emergence (McNaughton, 2007). The emergence phase began with *Learning for Life* (1993), Scotland's response to Agenda 21. It presented a comprehensive vision for ESD, emphasising holistic, participatory, and values-based learning aimed at developing action competence. The dormancy phase (1993–2004) saw a decline in momentum. Although additional reports like *Learning to Sustain* (1998) were published, ESD lacked political support, integration, and teacher training, resulting in fragmented practice. The re-emergence phase started with *A Curriculum for Excellence* (2004), which repositioned ESD as a cross-curricular theme supporting key educational capacities. This was reinforced by *Learning for Our Future* (2006), signalling renewed policy commitment to sustainability in education. Since the 1990s, pedagogical approaches to Sustainable Development Education (ESD) in Scotland have shifted from content-based instruction toward more experiential, interdisciplinary, and values-driven learning. *Learning for Life* (1993) outlined key principles such as holistic

integration, active participation, place-based learning, and action competence. These ideas were further reinforced by A Curriculum for Excellence (2004), which promoted ESD as a cross-cutting theme embedded within the development of four learner capacities. This reform encouraged more flexible, pupil-centred, and contextually relevant teaching practices, enabling sustainability to be addressed across subjects rather than confined to traditional environmental disciplines (McNaughton, 2007). Despite supportive policy frameworks, the implementation of ESD in Scottish schools has faced persistent barriers. These include inconsistent political commitment, limited teacher training in interdisciplinary and values-based pedagogy, and misalignment between assessment systems and sustainability goals. Additionally, resource constraints, especially for outdoor and experiential learning, have hindered widespread adoption. As a result, much of the progress has relied on individual teacher initiative rather than systemic support, leading to fragmented and uneven practice across schools.

While implementation has been uneven, notable progress includes initiatives like the Eco-Schools programme and localised teacher-led projects, which have raised awareness and fostered student engagement. The reformed curriculum provides a valuable opportunity to embed sustainability across subjects through interdisciplinary and values-oriented learning. However, realising the full potential of ESD requires sustained policy support, systematic teacher development, and alignment between educational goals and assessment practices. As McNaughton (2007) argues,

sustainability should not be treated as an add-on, but as a foundational ethos guiding the entire educational experience.

The Curriculum for Excellence (CfE), launched in 2004, represents a fundamental reform of Scotland's national education system, aiming to create a coherent, flexible, and learner-centred framework for children and young people aged 3 to 18. It was developed in response to changing societal needs, to prepare learners not only for academic success but also for active participation in a complex, interconnected, and rapidly evolving world (Education Scotland, 2023).

At the heart of CfE lies a commitment to nurturing four key capacities:

- *to enable all young people to become successful learners,*
- *confident individuals,*
- *responsible citizens, and*
- *effective contributors*

(Scottish Government, 2009).

These capacities reflect a holistic understanding of education as a lifelong process that encompasses not only intellectual development, but also personal, social, and ethical growth.

CfE is structured into two phases—Broad General Education (BGE) from early years to S3, and the Senior Phase from S4 to S6—allowing progression from foundational knowledge to more specialised learning. Learning is organised across eight curriculum areas and delivered through four interrelated contexts: subject teaching, interdisciplinary learning, the ethos and life of the school, and opportunities for personal achievement (Education Scotland, 2023). Crucially, CfE emphasises interdisciplinary learning and cross-curricular themes, among which Learning for Sustainability (LfS) holds a central place. LfS is embedded holistically across all curricular areas, serving as a unifying educational vision that integrates sustainable development education, global citizenship, and outdoor learning (Education Scotland, 2019). The Scottish Government’s One Planet Schools report (2012) provided the foundational vision for this integration, advocating for a transformative educational approach that cultivates not only ecological literacy but also the values of justice, responsibility, and active participation. This vision is operationalised in CfE through interdisciplinary learning, encouraging students to explore sustainability issues from multiple perspectives—scientific, geographical, cultural, and ethical—thus fostering critical thinking and systemic understanding. In alignment with this curricular commitment, the General Teaching Council for Scotland (GTCS) has embedded LfS into its Professional Standards (2012; updated 2021), thereby mandating that all registered teachers demonstrate competence in LfS-related pedagogies. This includes the capacity to design learning experiences that are place-based, inquiry-driven, and

action-oriented, ensuring that learners not only acquire knowledge but also develop the dispositions and skills necessary for sustainable living and civic engagement (GTCS, 2021). Moreover, LfS in CfE is underpinned by a whole-school approach that extends beyond the classroom to encompass institutional ethos, community partnerships, and student-led initiatives. Programmes such as Eco-Schools Scotland exemplify how schools actively cultivate sustainability practices through pupil leadership, environmental audits, and community involvement. Such integration reinforces the idea that education for sustainability must be lived, not just taught—a principle that positions Scotland as a leading example in embedding sustainability across education systems (Higgins & Nicol, 2002).

Since the formal integration of Learning for Sustainability (LfS) into the Curriculum for Excellence (CfE), a growing body of research has demonstrated its positive impact across multiple dimensions of Scottish education, including student learning, school culture, and teacher development.

a. Student Learning Outcomes and Competence Development

LfS has contributed significantly to the development of critical thinking, collaborative learning, and values-based judgment among learners. Studies such as Henderson & Tilbury (2021) highlight measurable gains in students' cognitive and socio-emotional capacities when engaged in sustainability-related inquiry. Moreover,

the implementation of LfS has operationalised the four core capacities of CfE—particularly in strengthening learners as “Responsible Citizens” and “Effective Contributors”, turning abstract curricular aims into tangible classroom practices.

b. Whole-School Cultural Transformation

LfS has been a catalyst for transforming schools into sustainability-oriented communities, where ecological literacy and participatory values permeate all levels of practice—from curriculum design and school governance to student-led initiatives and community partnerships. The Eco-Schools Scotland programme, coordinated by Keep Scotland Beautiful, has played a pivotal role in this shift. Participating schools consistently demonstrate higher levels of environmental awareness, pupil engagement, and institutional coherence in sustainability efforts (Keep Scotland Beautiful, 2022).

c. Professional Development and Teacher Agency

The integration of LfS has enhanced teachers’ capacity for interdisciplinary planning, reflective practice, and values-led pedagogy. According to the General Teaching Council for Scotland (GTCS, 2021), educators engaged in LfS-related professional learning report increased confidence in designing learning experiences that address complex real-world issues while promoting learner agency and ethical responsibility. These developments reflect a broader shift towards transformative

education, where sustainability is both a pedagogical orientation and a professional standard.

The incorporation of Learning for Sustainability (LfS) within the Curriculum for Excellence (CfE) signifies a thorough and ambitious initiative to integrate sustainability throughout all tiers of Scottish education. LfS serves as a cohesive framework that connects curricular design, pedagogical objectives, professional standards, and school-wide initiatives with knowledge acquisition, ethical action, civic engagement, and ecological responsibility. Elucidating this policy framework is crucial for comprehending the environment in which educators function. It offers the structural context within which individual instructional decisions are formulated, limitations are addressed, and values are understood.

This study examines teachers' comprehension and execution of environmental education, indicating that the policy landscape should not be seen as a neutral backdrop. Instead, it serves as a dynamic influence that moulds professional obligations, curricular emphases, and institutional culture. Although LfS offers a distinct normative framework, its implementation in classroom practice depends on teachers' interpretations, competencies, and institutional backing. This review emphasises the necessity of contextualising teacher perspectives within the extensive layers of policy, curriculum, and teacher standards related to Learning for Sustainability (LfS). It

underscores a fundamental conflict in sustainability education: the distinction between formal integration and practical application. This study intends to investigate the gap by empirically examining teacher attitudes, practices, and the problems encountered in achieving the objectives of LfS.

Ward *et al.* (2025) analyse the current status of Learning for Sustainability (LfS) implementation in Scotland, presenting four important points that highlight the discrepancies between national policy aspirations and the actualities of educational practice. They further identify the structural challenges that continue to hinder the transformative potential of sustainability education.

First, Ward *et al.* (2025) highlight a substantial gap between policy rhetoric and practical execution. Although Scotland is widely recognised internationally for its comprehensive integration of LfS into national education policy frameworks, its practical translation within educational settings remains fragmented and inconsistent. Despite substantial policy commitments at the national level, LfS in schools and community learning contexts often takes the form of piecemeal projects or symbolic initiatives. Students commonly report that their exposure to sustainability education lacks depth and coherence, falling short of the critical, interdisciplinary, and action-oriented learning objectives envisioned in policy discourse. This reflects a persistent and systemic misalignment between strategic vision and pedagogical reality.

Second, Ward *et al.* (2025) argue that the ambiguity of terminology undermines learner engagement and conceptual understanding. They emphasise that language serves not only as a means of communication but also as a formative mechanism in shaping comprehension and motivation in educational contexts. The term “Learning for Sustainability” is frequently perceived by both teachers and students as vague and overly theoretical, lacking emotional resonance and relevance to lived experience. In contrast, terms such as “Climate Change” or “Environmental Science” are considered more concrete and accessible. This linguistic vagueness weakens the perceived relevance and appeal of LfS, thereby constraining deeper learner engagement. The study thus asserts that the choice and framing of terminology directly affect both the receptiveness of educational content and the likelihood of translating knowledge into action.

Third, the authors contend that “best practice” alone is insufficient to realise the transformative aims of sustainability education. While acknowledging the existence of exemplary LfS initiatives—such as school gardens, eco-clubs, and outdoor learning programmes—they argue that many of these efforts remain at the level of “good practice” rather than achieving structural transformation. These activities often fail to challenge dominant educational paradigms or to embed sustainability meaningfully into the core curriculum. The authors stress that authentic LfS should cultivate key

competencies in learners, including systems thinking, ethical reflection, strategic action, and collaborative capacity—skills necessary to empower students as critical and active agents of social transformation. However, under current curricular and pedagogical arrangements, these competencies remain underdeveloped and institutionally marginalised.

Finally, Ward *et al.* (2025) identify the absence of systemic support as a fundamental barrier to the effective implementation of LfS. They argue that the marginalisation of LfS in many educational contexts is rooted in its exclusion from core institutional mechanisms. Across curriculum standards, teacher training programmes, school leadership structures, and funding allocations, LfS has yet to secure stable and embedded support. Teachers widely report a lack of time, resources, and professional development opportunities, which impedes their ability to integrate LfS meaningfully into regular pedagogical practice. As a result, the implementation of LfS often relies on the voluntary efforts of individual educators or the temporary involvement of external initiatives. Ward *et al.* (2025) contend that such structural neglect significantly constrains the scalability and sustainability of LfS, thereby diminishing its potential as a vehicle for educational transformation.

Recent literature further substantiates the structural obstacles identified by Ward *et al.* (2025). For instance, Christie & Higgins' (2020) review highlights the largely

qualitative nature of existing studies on LfS—emphasising benefits in learner motivation, social-emotional development and civic engagement, but noting a lack of research on fully integrated implementation across ESD, global citizenship and outdoor learning. Similarly, a national survey by NatureScot (2022) documents a decline in outdoor learning provision and inconsistent professional confidence in LfS, especially in primary settings—underlining a mismatch between strategic vision and classroom reality. Nicol et al. (2019) also find that initial teacher education often fails to embed LfS within practice, leaving new teachers underprepared to enact policy ideals in schools. Finally, findings from the Children’s Parliament inquiry (2022) offer a youth-centred perspective, where children advocate for regular outdoor learning and assert that climate education needs to be grounded in lived experience and supported institutionally. Together, these studies build on Ward’s critique: policy ambition alone is insufficient without sustained support in training, consistent terminology, institutional structures, and authentically engaging pedagogy.

According to Clarke and Mcphie (2016), it is essential to abandon the notion of “places” as static sites of learning. In its place, they propose a shift toward understanding “paths” as the mode through which learning unfolds. This conceptual shift draws upon Deleuze and Guattari’s theory of becoming, as well as Tim Ingold’s “anthropology of lines.” Within this framework, learning is not seen as an activity located in a fixed space, but rather as an ontological practice that emerges along paths—

a process of becoming through movement and engagement. While contemporary LfS discourses often highlight the interconnectedness of humans and ecological systems, Clarke and Mcphie suggest that such frameworks continue to operate within a subject-object dichotomy, treating nature as an external, knowable, and manageable “other.” In their view, systems thinking, though well-intentioned, obscures the ontological entanglements between learners and the world, thereby constraining the potential for genuinely transformative learning.

From this philosophical perspective, the authors propose reconceptualising education not as a transmission of knowledge, but as a mode of becoming-in-relation. Teachers and students are not seen as fixed identities or bearers of predefined competencies, but as haecceities—transitory, emergent configurations continually formed through pedagogical encounters. Learning, in this sense, is improvisational, relational, and always situated; it is a form of expression rather than unidirectional information delivery. Clarke and Mcphie (2016) further interrogate mainstream framings of global citizenship education and outdoor learning within LfS. Clarke and Mcphie (2016) caution that these concepts are often instrumentalised—reduced to measurable outcomes such as action-oriented skills or competency benchmarks—thereby failing to dismantle the conceptual divide between learner and environment. Moreover, they argue that “nature” is frequently romanticised in outdoor education as a passive resource to be experienced, reinforcing distance rather than intimacy. Instead,

they emphasise that all learning environments—whether indoor or outdoor—are dynamic and co-constitutive ecological spaces. Through an analysis of two teacher education programs in Scotland, Clarke and Mcphie (2016) highlight how current policy documents and curriculum designs remain constrained by structuralist logics. These frameworks tend to predefine learning outcomes and focus heavily on competency acquisition, which, in turn, neglects the generative potential of emergent, relational events in education. The authors contend that such goal-oriented approaches limit educators' capacity to foster genuinely symbiotic and transformative learning pathways.

This philosophical intervention by Clarke and Mcphie (2016) offers a critical counterpoint to dominant policy discourses that prioritise structure, competencies, and measurable impact. By reframing education as a relational, situated, and ontologically entangled process, their work challenges the reductionist tendencies within Learning for Sustainability (LfS)—particularly the instrumentalisation of outdoor learning and global citizenship education. In the context of this research, their insights help to problematize the assumption that policy integration alone is sufficient to produce transformative learning. Instead, they draw attention to the conceptual and ontological foundations of education, urging a reimagining of pedagogical space not as a container for prescribed outcomes, but as a generative field of emergence. This perspective is especially relevant to the comparative analysis between Scotland and Guizhou, as it

highlights how even seemingly progressive frameworks may carry embedded epistemological limitations. Thus, including Clarke and McPhie's critique enriches the theoretical depth of this study, enabling a more nuanced understanding of both the possibilities and constraints of sustainability education within differing cultural and curricular contexts.

The Scottish pathway to environmental education, as reflected through the Learning for Sustainability (LfS) framework, represents a relatively mature model of curriculum integration. Rooted in both global educational agendas and local policy development, this approach combines sustainable development education, global citizenship, and outdoor learning into a cohesive framework embedded within the Curriculum for Excellence (CfE). Through initiatives like Eco-Schools and whole-school participation models, many Scottish schools have successfully fostered a culture of sustainability that is both curricular and communal.

Nevertheless, while the policy ambition is strong, the implementation process is not without tension. Teachers often face challenges related to time constraints, assessment expectations, and varying levels of institutional support. These issues expose the gap between the normative claims of LfS as a "whole-school responsibility" and the actual structural capacity to enact it meaningfully in everyday practice. Despite these challenges, Scotland's experience demonstrates a

comprehensive attempt to move environmental education beyond isolated activities, positioning it as an integral part of educational reform and civic development.

This provides a valuable point of comparison with China's developmental pathway, where the institutionalisation of environmental education has followed a different trajectory marked by exam-oriented pressures, top-down policy shifts, and philosophical alignments with ecological civilisation. The following comparative section will explore how both countries, despite differing cultural and systemic contexts, have constructed distinct yet converging paths toward sustainability-oriented education.

2.4.3 Policy Orientations and Tensions in Environmental Education

In recent decades, China's environmental education programs have experienced substantial development, influenced by the prevailing national ideology of Ecological Civilisation. This ideological framework redefines environmental education as a fundamental component of moral and civic education while integrating it into overarching national development objectives (王晓红 & 张亦工 2021). Recent policies urge the cross-curricular integration of EE, aligning it with local culture, national identity, and sustainable development objectives, rather than considering it as a distinct subject. The 2022 National Curriculum Standards further reinforce this position by embedding “ecological awareness” and “green values” across all subjects, aiming to

cultivate students' capacity for sustainable thinking and responsible action (张志勇 & 张广斌, 2022). This document reflects a systemic effort to integrate environmental values into China's educational logic, moving from fragmented environmental knowledge to a more holistic ecological consciousness. Additionally, scholars have noted the emergence of a "garden-style school" model, where the built environment of schools—gardens, planting areas, recycling stations—becomes an extension of curriculum space (李世勇 & 杨芳, 2019). In Guizhou, for example, grassroots experiments show how policy principles can be localised to reflect ethnic cultures and environmental realities, enabling place-based approaches to EE.

However, despite these promising developments, policy implementation remains uneven. Researchers highlight ongoing tensions between top-down mandates and the realities of local school practice (赵敏, 2021), particularly in under-resourced rural areas. Moreover, while national documents emphasise ecological ethics, the lack of robust teacher training and context-sensitive curriculum materials limits pedagogical effectiveness (彭妮娅, 2021). In sum, China's environmental education policy architecture demonstrates a robust alignment with the national ecological vision. Yet, its effectiveness relies heavily on grassroots adaptations, adequate teacher preparation, and flexible curricular spaces—factors that remain underdeveloped and merit further policy attention.

In Scotland, the evolution of environmental education (EE) policy reflects a long-standing and structured commitment to embedding sustainability across the curriculum, teacher education, and whole-school culture. At the heart of this effort lies the *Learning for Sustainability: Vision 2030+ Action Plan* (Scottish Government, 2019), which frames sustainability not as a discrete subject but as a cross-cutting commitment throughout all educational levels and domains. This policy envisions schools as active contributors to environmental stewardship and social justice, advocating for interdisciplinary learning, learner agency, and community-connected practice.

The *Curriculum for Excellence (CfE)* further reinforces this orientation by giving teachers the autonomy to design learning around key capacities, particularly “Responsible Citizens” and “Effective Contributors”, within the framework of “experiences and outcomes” (Education Scotland, 2023). The CfE enables EE to be embedded in subject areas such as science, social studies, and outdoor learning, allowing flexibility in pedagogical approaches while aligning with national sustainability goals.

Importantly, the *GTCS Professional Standards for Teachers* (GTCS, 2021) institutionalise sustainability as a core value of professional practice. Teachers are expected to demonstrate values of social and ecological responsibility, with LfS

competencies forming part of their career-long development framework. This comprehensive alignment between curriculum, professional standards, and strategic planning represents a coherent and ambitious national model.

Nevertheless, criticisms have emerged. Ward *et al.* (2025) contend that although Scotland possesses a progressive vision, its implementation is inconsistent. Their research underscores ongoing deficiencies in teacher training, restricted access to contextually pertinent resources, and inadequate time designated for Learning for Sustainability (LfS) in practice. They caution against a disparity between policy ambitions and classroom realities, when noble intentions are not consistently accompanied by sufficient systemic support. They stated: “When best practices are insufficient, structural supports become the essential component.”

Higgins and Kirk (2006) offer a historical analysis of the evolution of Scotland’s Environmental Education (EE), tracing its development from global initiatives such as the UNESCO Tbilisi Declaration (1977) to local advancements in outdoor education and teacher training. They examine the impact of worldwide environmental discourse on national initiatives, specifically in integrating sustainability into teacher education and experiential learning. This legacy is seen in Scotland’s early implementation of whole-school methodologies and the utilisation of natural environments for ecological education.

Collectively, these policy documents and academic analyses indicate that although Scotland has made considerable progress in embedding sustainability throughout formal education, the actualisation of these objectives necessitates ongoing investment in teacher development, localised resources, and structural alignment. This research utilises the Scottish situation as an illustration of policy ambition juxtaposed with practical constraints, serving as a valuable contrast to the Chinese setting, where energy efficiency development has been predominantly state-driven yet inconsistently implemented.

To deepen the analysis, it is essential to situate these national policies within a broader global context. Comparative international research can help illuminate how structural, political, and economic forces shape the evolution and implementation of environmental education (EE) policies across regions.

Although the definition and purpose of environmental education may vary from one region to another, all regions will aim to extend its impact and draw attention for it by incorporating its propositions into their curricula. This section aims to discuss the effects of environmental education policies in different regions and the factors influencing the formulation of these policies.

In order to clarify the policy research involved in this part, a range of literature relating to environmental education policy was reviewed. In the study of Glasckin and King (2020), they reviewed environmental education policies in secondary schools in England, analysed and discussed the political and economic impact these policies have had, and reflected on the underlying rationale for the policies in the end. It is worth noting that, by adopting a contextual/historical perspective, they were able to establish a link between policy changes and economic waves. The closure of functional department advocating the use of environmental education to address larger social issues following the global financial downturn, the consequent loss of voice and the ‘back to basics’ ideological approach were introduced for education (including the prioritization of traditional subjects (STEM) and exam rankings) have all contributed to a gradual downgrading of the status of environmental education. As described in its findings, environmental education has always been subject to political cycles and ideologies and is inevitably influenced by economic ups and downs (Melissa & Glasckin, 2020). Moreover, this constraint and influence have pushed environmental education into a hypocritical environment. The fictitious concern for environmental education in policy handouts is manifested directly in the classroom: environmental education is used as a flexible tool to improve curriculum diversity, and this tool is restricted from being critical and innovative. Therefore, it could be concluded from their research that the economy indeed influences environmental education policy.

Meanwhile, the dominant subjects (such as mathematics, chemistry, physics etc.) that make up the majority of the curriculum squeeze the limited space for environmental education, and the environmental education has been forced to break up into fragments (which should not be interpreted as the interdisciplinary nature of environmental education) due to policy maker need to integrate its content into curriculum. This design makes it even more difficult for environmental education, which is already controversial in terms of both structure and purpose, to progress effectively. This exposes a key tension in environmental education: its instrumental use for curriculum enrichment versus its potential for critical and transformative learning.

In Aikens *et al.* (2016)'s study, they used a systematic literature review to analyse 40 years of research, covering 71 countries, focusing on the environment and sustainable development education policies. A study reviewed 215 research articles, all of which were in English and mainly concerned with English-speaking countries such as the UK, USA, Australia, and Canada. Thus, the reviewed research paid relatively little attention to research in non-English-speaking regions (such as countries in Asia or Latin America). As a result, the study has some obvious limitations. The study found three distinct peaks in policy research output: in the mid-1970s, the late 1990s, and from 2005 to the present. The researchers suggest that the last peak may be due to the impact of the Decade of Education for Sustainable Development (2016). By coding the collected publications, Aikens *et al.* have identified four themes: policy drivers,

competing paradigms, teaching and learning and marginalisation. In the section on policy drivers, the researchers point out that sustainable education is positioned as a solution to environmental and socio-cultural decay. In order to prevent tragedies like the Bhopal chemical spill (happened in 1984, India) and water-contamination in Walkerton, Ontario (occurred in 2000, Canada) and many other dreadful incidents all over the world from happening again, environmental education is expected to provide knowledge on how to deal with disasters. In other words, environmental education, as a tool to compensate for and intervene in environmental damage caused by human industrial and agricultural activities, has become an important factor in influencing policy. Despite growing global awareness of sustainability challenges, EE remains entangled in ideological, structural, and pedagogical contradictions, which in turn mirror the tensions identified in both the Chinese and Scottish contexts.

In addition, climate change has also become a major driver in the development of sustainability education policy, although its political framing and curricular treatment may vary across contexts. In the section on competing paradigms, reference is made to the competition between environmental education policies and environmentally sustainable development policies, with particular emphasis on the preference for economic primacy of ESD policies in some countries, leading to a renewed neoliberal agenda to expand its dominant role in education policy. In the section on teaching and learning, much of the literature critical of the failure of education policy is presented as

suggesting that the situation is not as smooth as in the previous two sections: there are only few elements of environmental education in textbooks, there is no independent curriculum to follow, and teachers are confused about how to follow the prescribed content. From influencing policy development to ineffective policy implementation, environmental education has not been as effective as its supporters had hoped, but it has suffered marginalisation after policy development. Many of these have again questioned the meaning, purpose, and pedagogical structure of environmental education, but the subjective perception of environmental education by policymakers has been easily neglected.

These global viewpoints highlight that environmental education is rarely insulated from overarching political and economic influences, irrespective of the country's situation. The persistent divergence between ambitious policy discourse and limited classroom realities—apparent in England and the broader Anglophone context—reflects the difficulties encountered in both China and Scotland. Environmental education initiatives frequently encounter challenges in transcending mere symbolic inclusion due to ideological goals, curriculum hierarchy, or institutional constraints, hence hindering transformative, place-responsive practices. Consequently, incorporating these global insights not only contextualises the difficulties observed in the Chinese and Scottish situations but also underscores the necessity for more

adaptable, regionally grounded, and critically reflective methodologies in policy design and execution.

2.5 Summary: From Concept to Contextualised Practice

The evolution of environmental education discourses—ranging from traditional EE to Education for Sustainable Development (ESD) and ecopedagogy—reflects a broader shift in educational paradigms from knowledge transmission to value formation, critical reflection, and action-oriented learning. Although these terms are often used interchangeably, they carry distinct theoretical and ideological emphases.

Environmental Education (EE) traditionally focuses on cultivating ecological knowledge and awareness, often through nature-based learning or science curricula. ESD, by contrast, expands the agenda to integrate social justice, economic development, and intergenerational equity, aligning more directly with the Sustainable Development Goals (SDGs) (UNESCO, 2017; Zhou, 2024). Ecopedagogy, meanwhile, draws heavily on critical pedagogy and Freirean thought, advocating for the politicisation of ecological learning and active resistance against unsustainable systems (Misiaszek, 2016; Zhou & Lee, 2024).

In the Chinese context, ESD has been incorporated into national education reforms under the broader political agenda of “ecological civilisation”(生态文明), which

reconfigures sustainability not only as an educational goal but as a moral-political duty (Zhou & Lee, 2024). Unlike the more grassroots or participatory approaches seen in some Western countries, China's ecological turn has mainly been top-down, state-driven, and ideologically embedded. Recent studies reveal that Chinese teachers often interpret sustainability in pragmatic, moralistic, or apolitical terms, reflecting both policy rhetoric and local constraints (Zhou, 2024). However, this incorporation into national policy discourse has also enabled structural changes, such as the integration of ESD into textbooks and teacher training across provinces (PMC, 2023).

Meanwhile, Scotland's Learning for Sustainability (LfS) approach adopts a more systemic and pluralistic pedagogy, aiming to connect climate education, global citizenship, and outdoor learning within the Curriculum for Excellence (Ward *et al.*, 2025). Teacher agency, institutional culture, and school-community partnerships are emphasised as key mechanisms for implementation, with a stronger focus on student-led inquiry and place-based engagement. This model also aligns with ecopedagogical ideals, particularly in how it fosters emotional connection to place, critical consciousness, and local stewardship (Christie *et al.*, 2019).

Comparing these two pathways reveals significant tensions between state ideology and teacher autonomy, between instrumental and transformative goals, and between technical knowledge and affective connection. The evolution from EE to ESD, and

toward ecopedagogy, highlights not only a conceptual expansion but also the necessity to contextualise sustainability education within specific sociopolitical and cultural ecosystems.

In summary, while Environmental Education (EE), Education for Sustainable Development (ESD), and ecopedagogy share overlapping goals, they differ in emphasis, scope, and pedagogical orientation. Recent developments show a shift from knowledge-based transmission models toward approaches that foreground action, participation, and local responsiveness. Within this transformation, cultural traditions, institutional arrangements, and teacher agency play crucial roles in mediating how global educational discourses are interpreted and enacted in specific contexts. This dynamic interplay reflects the complexity and diversity of environmental education practices and provides a conceptual foundation for understanding how EE evolves across different national settings.

2.6 Theoretical framework

This study adopts a hybrid theoretical framework to support a comparative exploration of how teachers in Guizhou, China, and Scotland, UK, understand and implement environmental education in their daily practice. Rather than focusing exclusively on curriculum policy, the research investigates teachers' lived experiences

and their conceptualisations of EE, while also attending to the practical constraints, institutional resistances, and cultural influences they encounter during implementation. The framework draws on selected Western theories—including *constructivist learning theory*, which explains how teachers facilitate experiential and inquiry-based learning; *ecological systems theory* (Bronfenbrenner), which illuminates how broader institutional, cultural, and policy environments shape classroom practice; and *curriculum theory* (Young, Bernstein), which helps examine how knowledge is selected, framed, and transmitted.

To ensure a culturally balanced perspective, the framework also incorporates Chinese indigenous perspectives, such as *holistic education theory*, which emphasizes moral and ecological harmony in human development; Xi Jinping’s *theory of Ecological Civilization*, which provides a national ideological basis for environmental education in China; and the *Confucian philosophy of harmony* (和谐), which influences how Chinese teachers perceive the human–nature relationship. Together, these perspectives offer a multi-layered lens to understand teachers’ pedagogical beliefs, their practice-based dilemmas, and the socio-political conditions that shape environmental education in contrasting cultural contexts.

2.6.1 Constructivist Learning Theory.

Among the theoretical perspectives informing this study, Constructivist Learning Theory offers valuable insight into how learners engage with and internalise environmental knowledge. Drawing on Piaget's cognitive constructivism, Vygotsky's sociocultural theory, and Dewey's experiential learning, constructivist learning theory emphasises that knowledge is not passively absorbed but actively constructed by learners through engagement with both internal cognition and external contexts. Piaget (1952) proposed that learners construct understanding through continuous adaptation of their cognitive structures via the dual processes of assimilation and accommodation, highlighting the role of individual mental development in grasping complex environmental concepts. Vygotsky (1978), by contrast, emphasised that learning is deeply situated within sociocultural contexts, where interaction with more knowledgeable others—within the Zone of Proximal Development (ZPD)—enables learners to co-construct meaning. His theory underscores the importance of scaffolding, language, and social interaction in facilitating learning. Dewey (1938) further extended the constructivist perspective by asserting that education must be rooted in real-life experience; meaningful learning emerges through learning by doing and reflective inquiry, allowing learners to develop understanding through direct engagement with their environment.

Together, these theoretical perspectives provide a robust foundation for examining how pedagogical practices and student engagement are shaped within environmental

education contexts. In particular, they offer a valuable lens for analysing how teachers in Guizhou and Scotland design and deliver learning experiences, facilitate social interaction, and connect ecological knowledge with students' lived experiences. This theoretical grounding is especially relevant in the context of environmental education, where knowledge is often interdisciplinary, value-laden, and situated within real-world ecological and social challenges.

Constructivist learning theory, with its focus on learner-centred, context-sensitive, and socially mediated meaning-making, offers a pertinent framework for analysing how educators conceptualise and execute environmental education in practice. Teachers are not just transmitters of curriculum but also active interpreters and architects of learning experiences; thus, their pedagogical decisions frequently mirror their own convictions, contextual limitations, and engagements with students. In this context, constructivism facilitates a comprehensive knowledge of how educators formulate their interpretations of environmental education, tailor educational objectives to local circumstances, and reconcile top-down policies with bottom-up classroom activities. This theoretical framework closely aligns with the aims of the current study, which intends to investigate (1) the implementation of environmental education by teacher in Guizhou and Scotland; (2) the resistances and challenges they face; (3) the strategies employed to address these challenges; and (4) the conceptual similarities and differences between the two contexts.

Constructivist learning theory posits that the learner actively builds information through engagement with their environment and reflection on experiences, rather than being passively acquired. Klein and Merritt (1994), referencing the contributions of Clements and Battista (1990), Chaille and Britain (1991), and additional constructivist theorists, delineate four fundamental theoretical concepts that support this approach. Knowledge is actively constructed, rather than conveyed from teacher to student. Secondly, learners cultivate comprehension through the reflection on their physical and cognitive activities. The production of knowledge is influenced by earlier experiences and mediated by social and cultural settings, recognising the absence of a singular objective reality and the existence of various interpretations affected by human viewpoints. Ultimately, learning is perceived as an inherently social process in which learners assimilate knowledge through discourse and interaction with others. These principles offer a theoretical justification for educational settings that emphasise inquiry, cooperation, and contextualised meaning-making (Klein & Merritt, 1994, pp. 15–16).

Building on these theoretical foundations, Klein and Merritt (1994) further identify four key components required to implement constructivist teaching effectively in classroom settings. First, learning should begin with the introduction of a real-life problem, either proposed by the teacher or the students, which serves to anchor the

lesson in meaningful and authentic contexts. Second, instruction must be student-centred, with teachers acting as facilitators who guide inquiry and provide resources, rather than as direct transmitters of knowledge. Third, constructivist classrooms emphasise productive group interaction, where learners collaborate, defend viewpoints, and co-construct understanding through discussion and shared activity. Lastly, assessment practices should reflect the nature of constructivist learning by employing authentic assessment strategies, such as performance tasks, projects, and portfolio-based evaluations, which allow students to demonstrate conceptual understanding and applied skills in realistic contexts. These instructional features collectively embody the constructivist philosophy and offer practical strategies for fostering deeper, inquiry-driven learning across disciplines (Klein & Merritt, 1994, pp. 16–17).

Recent meta-analytic research has provided compelling evidence for the effectiveness of constructivist approaches in environmental education. Arık and Yılmaz (2020), analysing 57 empirical studies involving over 6,000 students, reported a large overall effect size (Hedges' $g = 1.463$), indicating that constructivist and active learning strategies significantly enhance students' environmental knowledge, attitudes, and behavioural skills. These effects were particularly pronounced in primary education, where younger learners appeared to benefit most from experiential and inquiry-based activities. Moreover, constructivist pedagogy showed a substantial impact across different learning outcomes, with the most significant gains observed in environmental

knowledge, followed by attitudes and skills. Notably, the study also highlighted that specific instructional methods aligned with constructivist principles—such as project-based learning, cooperative learning, and problem-based inquiry—were especially effective in fostering deep understanding and engagement. These findings suggest that constructivist learning theory offers not only a philosophically coherent framework but also empirically supported strategies that are well suited to the complex, interdisciplinary, and values-driven nature of environmental education.

This empirical evidence provides a valuable theoretical foundation for understanding how teachers design environmental education activities, foster student engagement, and guide conceptual development. It also offers a valuable reference point for the present study's comparative focus on pedagogical practices in Guizhou and Scotland. In both contexts, teachers' understanding and implementation of environmental education are inevitably shaped by their cultural background, curriculum frameworks, and pedagogical beliefs. The core principles of constructivism—student-centeredness, contextualised learning, and collaborative inquiry—offer a powerful lens for examining how educators in these two regions structure their teaching and how students are supported in constructing environmental meaning.

Therefore, in this study, constructivist learning theory is not only treated as a widely applicable pedagogical approach in environmental education but also employed as an analytical tool for exploring teaching practices. By comparing how teachers in Guizhou and Scotland reflect (or fail to reflect) the core features of constructivist pedagogy, this research seeks to uncover how cultural and institutional factors shape educators' conceptions and enactments of environmental education. This, in turn, may offer insights for the development of more locally responsive and contextually grounded curricula in the future.

While constructivist learning theory offers a powerful lens for examining learner-centred, experience-based pedagogies, its application across diverse cultural contexts is not without challenge. As Tan (2016) critically observes, the implementation of constructivist pedagogy in China often encounters tensions with local educational traditions, institutional norms, and socio-political structures. Rooted in Confucian heritage, Chinese classrooms have long emphasised hierarchical teacher–student relationships and knowledge transmission, which may conflict with constructivist principles that advocate student autonomy and inquiry-based learning. Moreover, the high-stakes examination system further constrains the feasibility of learner-centred approaches, as teachers are compelled to prioritise content delivery and test preparation over exploratory learning. Tan argues that these systemic and cultural barriers necessitate a cautious and context-sensitive adoption of constructivist models, rather

than a wholesale transfer from Western contexts (Tan, 2016, pp. 3–6). In the context of this study, these insights are particularly relevant when analysing the pedagogical practices of teachers in Guizhou, where local values, policy priorities, and resource limitations may shape how constructivist principles are interpreted and enacted in environmental education.

2.6.2 Ecological Systems Theory

A second theoretical lens that frames this study is Ecological Systems Theory, originally conceptualised by Urie Bronfenbrenner in his seminal work *The Ecology of Human Development: Experiments by Nature and Design* (1979). This theory offers a multilayered model for understanding how individual development—and by extension, educational practices—are embedded within and shaped by interacting environmental systems. Bronfenbrenner emphasised that human behaviour and learning are not isolated occurrences but are deeply situated within nested structures of environmental influence, each with its own degree of proximity and impact (Bronfenbrenner, 1979, pp. 3–25).

The model consists of five concentric layers:

- The microsystem refers to the immediate settings in which individuals engage in face-to-face interactions, such as the home, classroom, or peer group.

- The mesosystem denotes the interconnections among various microsystems—for example, how communication between teachers and parents influences a student’s environmental learning.
- The exosystem includes broader structures that indirectly affect the individual, such as educational policies, school governance, and parental workplace conditions.
- The macrosystem encompasses cultural ideologies, legal frameworks, and societal values that shape systemic educational priorities and expectations.
- Finally, the chronosystem introduces a temporal dimension, recognising that personal development and institutional change occur over time, such as shifts in environmental education policy or major socio-political transformations.

Within the context of environmental education, this ecological perspective is especially pertinent, as it draws attention to the complex, multilayered influences—policy, institutional structures, community norms, and historical legacies—that inform both the content and delivery of environmental curricula. When applied to a comparative study of Guizhou and Scotland, Bronfenbrenner’s framework facilitates an exploration of how broader structural forces and cultural expectations intersect with local teaching practices. It thereby helps uncover why teachers may implement

environmental education differently despite similar global discourses on sustainability and ecological responsibility.

Ecological Systems Theory offers a particularly valuable framework for this comparative study of environmental education practices in Guizhou, China, and Scotland, UK. In both contexts, teachers' understanding and enactment of environmental education are shaped not only by personal beliefs but also by a constellation of social, cultural, institutional, and policy-level influences. For instance, pedagogical decisions may be simultaneously informed by national curriculum frameworks and professional standards, as well as by region-specific ecological concerns, traditions of community engagement, and local policy initiatives. The theory's nested model enables this study to explore how these multi-layered contextual forces operate together to influence how environmental education is interpreted and delivered in the classroom.

Bronfenbrenner's ecological systems model conceptualises human development within five interrelated levels: the microsystem (e.g., classroom and family), mesosystem (interactions between microsystems), ecosystem (structures indirectly affecting the individual, such as institutional policy), macrosystem (cultural beliefs and societal norms), and chronosystem (the dimension of time and historical change). This framework is especially apt for environmental education, given the inherently

interdisciplinary, value-laden, and socially embedded nature of the subject. It provides a means to move beyond the individual level of teacher practice and examine the broader sociocultural and institutional systems that shape teaching and learning.

For example, in Guizhou and Scotland, teachers' interpretation and implementation of environmental education may be shaped not only by national curriculum frameworks and professional standards, but also by regional ecological concerns, community engagement traditions, and local policy initiatives. The ecological systems lens thus enables this study to explore how multi-layered contextual forces—ranging from school climate and parental involvement to national education priorities and cultural worldviews—impact the pedagogical decisions made by educators. Importantly, it also helps to reveal potential tensions between top-down policy mandates and bottom-up classroom practices, offering a nuanced understanding of how environmental education is adapted or resisted across different educational systems.

Tidball (2011) offers a valuable ecological reconceptualisation of environmental education by arguing that learning itself should be understood as an ecological phenomenon—emerging within, responding to, and shaping its surrounding systems. He extends Bronfenbrenner's ecological systems theory by outlining five interrelated levels at which environmental learning operates: individual (intrapersonal),

interpersonal, institutional, community/cultural, and policy/ecological-structural. Each level interacts with the others, forming a dynamic and nested framework that situates teaching and learning within broader sociocultural and ecological contexts. Particularly relevant to environmental education is the emphasis on fostering “social-ecological linkages,” where learners develop a place-based ecological identity that connects them emotionally and cognitively to their local environment. This reconceptualisation positions education not merely as content delivery but as a process of regenerating human-nature relationships across institutional and cultural boundaries. For the present study, Tidball’s ecological framing offers a valuable lens to analyse how teachers’ practices in Guizhou and Scotland are embedded within, and shaped by, multi-layered systems—ranging from national policy mandates and curriculum structures to local ecological concerns and community engagement norms. It also supports a more holistic understanding of how environmental learning is enacted and resisted across different educational settings.

In summary, Ecological Systems Theory provides a valuable lens through which to examine how environmental education is shaped not only by immediate classroom practices but also by broader institutional, cultural, and policy contexts. By emphasising the interconnectedness of multiple systemic layers—from interpersonal relationships and school culture to regional ecological concerns and national education agendas—this perspective enables a holistic exploration of how teachers interpret, adapt, or resist

environmental education within their specific socio-ecological environments. Importantly, it allows for the identification of both structural constraints and enabling conditions that influence pedagogical decisions and curricular enactments. By adopting this perspective, the research can account for both macro-level systems and micro-level practices, offering a culturally sensitive and theoretically grounded understanding of how environmental education is shaped, negotiated, and enacted within distinct educational ecosystems such as those of Guizhou and Scotland.

2.6.3 Curriculum Theory

Curriculum theory provides a critical framework for examining how educational content is structured, interpreted, and enacted by educators within specific social, political, and cultural contexts. It moves beyond the notion of curriculum as a fixed set of prescribed knowledge, instead emphasising curriculum as a dynamic and contested space shaped by ideological, institutional, and practical forces (Pinar, 2004; Apple, 1979). Within environmental education, curriculum theory is particularly relevant, as EE often involves interdisciplinary content, ethical deliberation, and engagement with place-based knowledge systems—dimensions that resist standardisation and invite critical interpretation.

This study draws on curriculum theory to explore how environmental education is understood and implemented by teachers in Guizhou and Scotland, recognising teachers not as passive deliverers of policy, but as active curriculum-makers who negotiate between top-down mandates and local pedagogical realities (Priestley & Biesta, 2013). In doing so, curriculum is understood not only as an official document but also as a lived, interpreted, and enacted practice. Through this lens, the research seeks to reveal how teachers adapt environmental content to their learners' contexts, what tensions arise between official frameworks and local needs, and how culturally specific values influence curricular choices.

In Payne's (2006) discussion of curriculum theory in environmental education, he emphasises that effective environmental learning requires more than the delivery of factual knowledge or compliance with national policy objectives. Instead, he argues for a curriculum approach that is grounded in learners' lived experiences and their emotional, ethical, and cultural connections to the environment. From this perspective, curriculum is not simply a plan for instruction, but a dynamic space where learners engage with real-world environmental issues in meaningful and reflective ways. Environmental education, therefore, should encourage students to critically explore their values, identities, and responsibilities as ecological citizens. Payne highlights that curriculum theorising must account for the political and ethical dimensions of how people relate to nature, and should aim to support transformative learning that

empowers students to act with care and critical awareness in their environments (Payne, 2006). In the context of environmental education, Curriculum theory offers a framework for examining not only the content of what is taught, but also the processes through which knowledge is constructed, legitimised, and enacted in classrooms. It invites questions about whose knowledge is valued, how learning connects to students' everyday lives, and whether teaching practices reproduce or challenge dominant cultural and ecological narratives. This lens is especially relevant to comparative studies such as this one, which examines environmental education in Guizhou and Scotland—two regions shaped by different historical, ecological, and institutional contexts. Payne's (2006) advocacy for an "ecocentric" and experiential curriculum emphasises the necessity of anchoring environmental education in students' living experiences and cultivating a feeling of ecological responsibility. This study seeks to investigate how teachers in both contexts perceive and execute environmental education, not solely as the transmission of subject matter, but as a pedagogical practice influenced by local cultural and ecological contexts, informed by ethical and political principles, and rooted in critical reflection.

In complementing Western perspectives on curriculum theory, Sun and Sun (2022) provide a valuable account of how environmental education is conceptualised and operationalised within the Chinese curriculum system. Drawing from an analysis of curriculum development initiatives in China, the authors highlight how top-down

national education reforms interact with localised implementation strategies, particularly in rural and under-resourced areas. The study reveals that while national policy documents emphasise the integration of environmental values and ecological literacy, actual curricular practices are significantly shaped by contextual factors such as teacher capacity, school infrastructure, and regional ecological concerns. This resonates with curriculum theorists' view of curriculum as a situated and negotiated process (Pinar, 2012; Payne, 2006), where educators interpret and adapt broad policy mandates to fit local realities. By including this perspective, the present study aims to explore how curriculum theory can illuminate not only the content and structure of environmental education but also the relational, political, and practical dimensions of its implementation across distinct cultural contexts, such as Guizhou and Scotland.

Curriculum theory has evolved from viewing curriculum as a fixed set of objectives or content to understanding it as a socially embedded and dynamic practice. Priestley *et al.* (2012), in their contribution to *Reinventing the Curriculum*, argue for a shift from a technical-rational view of curriculum as a product toward a conception of curriculum as praxis—shaped by context, teacher agency, and institutional conditions. Central to their analysis is the Curriculum for Excellence (CfE) in Scotland, which attempts to empower teachers as “curriculum makers” rather than mere implementers of top-down policy. Under this framework, teachers are encouraged to design interdisciplinary, locally relevant, and student-centred learning experiences. However,

the authors critique the structural constraints that continue to inhibit teacher agency, including high-stakes assessment regimes, policy vagueness, and limited professional support. To address this complexity, Priestley and colleagues adopt an “ecological model of agency,” which conceptualises teacher agency as context-dependent and achieved through the interaction of structural and cultural conditions. This perspective is especially relevant to comparative studies like the present one, as it highlights the tension between national curriculum aspirations and on-the-ground realities of educational practice. Reflecting on this reframing of curriculum theory, this study examines how teachers in Guizhou and Scotland navigate institutional pressures, interpret curricular freedom, and construct environmental education in ways that are reflective, situated, and relational.

2.6.4 Holistic Education

Miller (2007) defines holistic education as an approach that seeks the *wholeness* of human development by nurturing intellectual, emotional, physical, social, aesthetic, and spiritual dimensions of learners. Rather than focusing narrowly on cognitive achievement or standardised outcomes, he argues that holistic education aims to cultivate self-awareness, personal meaning, interconnectedness, and ethical responsibility in learners. He identifies five core principles underpinning this

educational philosophy: (1) Connection, which emphasizes the learner's relationship to self, others, nature, and the universe; (2) Balance, ensuring that education does not privilege rational knowing over emotional or intuitive ways of understanding; (3) Inclusion, meaning that multiple ways of knowing—including artistic, experiential, and spiritual forms—are valued alongside academic knowledge; (4) Contextualization, where learning is situated in real-world, lived experiences; and (5) Transformation, whereby education is a process of personal and social change rather than passive knowledge acquisition (Miller, 2007). This framework aligns with environmental education's emphasis on ecological awareness, ethical engagement, and experiential learning, offering a particularly resonant lens for understanding how Chinese educators might integrate values, emotions, and interconnection into their pedagogical practice.

Lawrence (2014) significantly expands the concept of holistic education by proposing an integrated approach that engages the mind, body, heart, and spirit of the learner in relation to their learning environment. Critiquing traditional curriculum models as overly rigid and fragmented, Lawrence (2014) argues that genuinely holistic learning must be environmentally grounded, participatory, and culturally responsive. She emphasises connecting learners not only cognitively but also emotionally and physically to their environment through practices such as place-based experiences, arts integration, and reflective engagement. This comprehensive approach shifts education toward a relational process—one that nurtures ecological awareness, emotional

resonance, and embodied understanding—moving beyond knowledge acquisition into transformative learning aligned with environmental education goals.

Recent literature has emphasised the significance of holistic education as a fundamental framework for promoting sustainability and environmental education in higher education. Cebrián *et al.* (2022) contend that an effective ecological education strategy must be incorporated within a comprehensive institutional framework that encompasses learning and teaching practices, teacher professional development, and extensive organisational transformation. They prioritise multidisciplinary and experiential learning frameworks that foster systems thinking, critical thought, and ethical involvement with environmental concerns. In the realm of teacher development, there is an emphasis on the necessity for ongoing professional learning that enables educators to internalise holistic ideas and implement student-centred, sustainability-focused pedagogies. The authors emphasise the necessity of institutional support: policies, leadership practices, and organisational cultures must be congruent with sustainability objectives to facilitate enduring transformation (Cebrián *et al.*, 2022). This multifaceted perspective underscores that environmental education is inextricably linked to the structural and cultural ecosystems of the institutions that provide it, aligning closely with holistic education's focus on the integration of mind, body, and spirit, as well as interconnection. This paradigm offers a significant theoretical basis

for analysing how educators in Guizhou and Scotland navigate the systemic, pedagogical, and cultural factors influencing their environmental teaching methods.

The concept of holistic education challenges the established dualism paradigms in Western epistemology, specifically the division between mind and body, as well as between humans and nature. In numerous Western educational frameworks, knowledge is frequently perceived as an abstract, rational construct that prioritises logic, language patterns, and analytical categorisation, while downplaying affective, sensory, and embodied aspects of understanding. Cognitive-centric paradigms not only reduce the various modalities through which humans see the world but also strengthen anthropocentric disconnection from nature (Tan, 2023). In contrast, Tan (2023) emphasises Eastern philosophical traditions, including Daoist and Confucian interpretations of the “heart–mind”(xin 心), which underscore the synthesis of knowledge, emotion, and bodily awareness. Learning is perceived not as the passive acquisition of information but as an embodied and relational process, where individuals comprehend the environment through harmony with natural rhythms, emotional resonance, and intuitive perception. Nature is not a neutral or passive entity but an active partner in the creation of meaning, endowed with inherent value and agency (Tan, 2023). This relational ontology reconceptualises environmental education as a means of revitalising sensory and ethical consciousness towards the more-than-human world. Students are urged to develop ecological awareness by engaging with the environment

not only intellectually but also emotionally and physically (Tan, 2023). This methodology reconceptualises knowledge formation as a co-evolutionary process between the individual and the environment, potentially enhancing ethical engagement and promoting more sustainable action patterns. Holistic education offers a critical theoretical lens for this study's analysis of environmental education in Guizhou and Scotland, especially in terms of how cultural worldviews shape pedagogical priorities. The focus on embodied learning and relational knowledge construction aligns closely with localised methods of environmental education in both cultures, offering a culturally nuanced alternative to solely cognitive or technocratic curriculum frameworks.

2.6.5 Confucian philosophy of harmony (Hexie 和谐)

Tu Weiming's interpretation of Confucian philosophy provides a culturally rooted perspective for comprehending ecological harmony, especially for those unacquainted with East Asian philosophical systems. Tu (1998) contends that the essence of Confucian philosophy is a relational cosmology, wherein the universe is characterised not by isolated entities but by a network of dynamic interrelations among heaven (tian 天), earth (di 地), and humanity (ren 人) (Tu,1998). This viewpoint originates in the notion of *Tian ren he yi* (unity of heaven and humanity 天人合一), which asserts that humans are not separate from nature, but are morally and spiritually integrated within

it. Humans are anticipated to engage in the continuous moral and ecological transformation of the world—not through domination, but by developing themselves in harmony with natural patterns.

At the core of this concept is *ren* (humaneness or benevolence), a fundamental Confucian virtue that Tu extends beyond interpersonal ethics to include the human interaction with the non-human realm. *Ren* encompasses empathy, caring, and moral sensitivity, providing a foundation for fostering ecological awareness in education (Tu, 1998). *Li* (ritual propriety 礼) is understood not merely as a social conduct rule but as an embodied practice that harmonises human acts with natural and cosmic rhythms, promoting respectful and sustainable lifestyles. Tu (1998) emphasises the importance of *sheng sheng bu xi* (ceaseless generativity 生生不息), a Confucian cosmological notion that characterises the universe as an incessantly renewing, life-generating phenomenon. This dynamic perspective of nature underscores the notion that human activities have ethical significance, as they engage in and affect the continuous creation of life. Through reverence and moderation, humanity can maintain the world's peace. In the context of environmental education, Tu's ecological Confucianism encourages educators and learners to develop an ethical relationship with nature, grounded not in utilitarian use or scientific abstraction, but in cultural values, moral cultivation, and existential reverence. This culturally specific yet globally relevant perspective offers a

valuable foundation for integrating indigenous Chinese philosophical traditions into holistic models of environmental education.

This perspective, as expressed in Ecological Civilisation, Confucianism, and the Meaning of Life (Tucker, 2025), regards nature not merely as an external resource to be governed, but as an extension of the ethical self, wherein personal cultivation (*xiushen* 修身) and ecological duty are inextricably linked. Confucian principles, including *ren* (benevolence) and *li* (ritual propriety), transcend interpersonal ethics to assist individuals in cultivating humility, empathy, and respect for the natural environment. In modern China, *tianren heyi* has been revitalised within the framework of ecological civilisation as a means of cultural regeneration. This transformation functions on two levels: symbolically, it signifies cultural confidence within green modernisation; institutionally, it is integrated into the official narrative of “humans and nature as a community of life,” reflected in environmental education policies, ecological urban planning, and school curricula (Tucker, 2025).

Confucian ethics offers a substantial repository of philosophical and moral materials for ecological education, especially in Chinese cultural contexts. Grounded in fundamental ethical principles like Ren (benevolence), Yi (righteousness), Li (ritual propriety), Zhi (wisdom), and Xin (trustworthiness), Confucian philosophy fosters a holistic understanding of human-nature interactions based on relationality, moral

obligation, and harmony (Nuyen, 2008). “Ren” expands from interpersonal compassion to encompass empathy and care for all living entities and the natural environment, establishing the emotional basis for ecological awareness. “Yi” signifies that individuals ought to engage in environmental decision-making with a sense of responsibility, led by ethical considerations rather than personal gain. “Li” advocates for ecological self-regulation and behavioural practices that exemplify respect and moderation in everyday life. “Zhi” promotes a sagacious and knowledgeable interaction with environmental intricacies, whilst “Xin” emphasises the fidelity to ecological obligations and sustainable methodologies (Nuyen, 2008). Significantly, the Confucianism focus on the “unity of knowledge and action”(知行合一) closely corresponds with the transformative objectives of environmental education. Learning transcends the mere conveyance of information; it is a process of ethical development manifested via tangible ecological activities. The paper “Ecological Education: What Resources Are There in Confucian Ethics?” contends that this paradigm enables environmental education to transcend cognitive growth and foster the ethical creation of ecological subjects (Nuyen, 2008). The incorporation of Confucian ethics into environmental education provides culturally relevant instructional direction, prompting both educators and students to assimilate environmental values as integral to individual and communal moral development.

The empirical study conducted in a Beijing kindergarten demonstrates how Confucian ethics can offer a culturally grounded moral framework for Education for Sustainability (EfS) (Li *et al.*, 2023). This study illustrates that Confucianism provides a robust ethical framework for contextualising Education for Sustainability (EfS) in China (Li *et al.*, 2023). The fundamental Confucian virtues of ren (benevolence), li (ritual propriety), and yi (righteousness) function as moral foundations that closely correspond with the normative objectives of EfS. Ren (仁) is understood as compassion for others and an ethic of care for nature and all living beings, fostering a relational comprehension of ecological interconnectivity. Li (礼), as a framework for appropriate behaviour and societal peace, promotes respectful conduct towards both individuals and the environment, instilling ecological discipline from an early age. Yi (义) instructs individuals to behave ethically not for self-interest but for the collective benefit, fostering fairness, accountability, and community-focused perspectives in addressing environmental issues. The ethical components align with the objectives of Education for Sustainability—ecological responsibility, social justice, and ethical engagement—providing a culturally rooted moral foundation for sustainability education in Chinese contexts. Moreover, the authors (Li *et al.*, 2023) contend that effective implementation of Education for Sustainability (EfS) in non-Western contexts necessitates a process of cultural recontextualization, rather than the direct adoption of Western paradigms. Confucianism, as a fundamental cultural and moral heritage in China, provides pedagogical and ethical resources that can significantly enhance Education for

Sustainability (EfS) practices, especially in early childhood education. In the examined kindergarten, teachers utilised culturally significant techniques, including storytelling, group discussions, and role-play, to integrate Confucian principles into everyday learning activities (Li *et al.*, 2023). In a lecture on resource sharing, the teacher directed pupils to investigate the notion of li (ritual and propriety) through realistic situations of collaboration and respect, facilitating the internalisation of values related to reciprocal care and responsibility (Li *et al.*, 2023). These pedagogical tactics ensure that Education for Sustainability (EfS) is not viewed as an abstract global discourse but is instead rooted in recognisable cultural frameworks, emotionally engaging, and practically applicable. This cultural engagement transforms EfS from mere curricular knowledge into a lived moral experience integrated into the students' daily lives.

2.6.6 Xi Jinping's theory of Ecological Civilization

Xi Jinping's theory of Ecological Civilisation exemplifies a strategic integration of traditional cultural symbols into modern political governance. Xue *et al* (2023) contend that the concept of *tianren heyi* (unity of heaven and humanity), originating from Confucian philosophy, has been symbolically recontextualised within political discourse as "humans and nature as a community of life". This rearticulation offers cultural legitimacy and an ethical foundation for the state's ecological stewardship. In the context of the Ecological Civilisation narrative, *tianren heyi* has evolved from a

mere metaphysical and ethical concept into a normative principle that underpins environmental policy, public education, and urban ecological planning (Xue *et al.*, 2023). Integrating ancient ideas with modern government is an example of a culturally secure way to modernise. It is also a key part of creating a Chinese model of green development that fits with global stories like the “Community of Shared Future for Mankind”. The institutionalisation of this concept is seen in ecological redlining legislation, green performance metrics for local officials, and the integration of ecological principles into educational curriculum. This state-directed reinterpretation of Confucian philosophy demonstrates the selective revival of historic notions to support contemporary sustainable governance, providing a distinct culturally rooted approach for environmental education and policy.

Pan *et al.* (2021) present an explicit analytical framework outlining four principal characteristics of Chinese education from historical and cultural viewpoints. The Confucian paradigm of individual and societal advancement—articulated in the sequence “cultivate the self, regulate the family, govern the state, and bring peace to the world”(xiushen qijia zhiguo pingtianxia 修身齐家治国平天下)—constitutes the fundamental objective framework of Chinese education. This perspective regards education not only as a tool for knowledge dissemination but also as a crucial instrument for cultivating exemplary moral character and establishing social order (Pan *et al.*, 2021). As a result, moral education (*deyu* 德育) is emphasised, with teachers

regarded as moral exemplars and cultural transmitters rather than mere technical instructors. Second, Pan *et al.* (2021) emphasise the profound relationship between education and state governance in Chinese history. Education has historically functioned as a means of identifying virtuous individuals and ensuring political stability, most exemplified by the imperial examination system. This structural alignment endures in modern China, where education continues to be a crucial foundation for national unity and advancement. Third, Pan *et al.* (2021) contend that education in China possesses a modernising mandate. It bears the weight of technical advancement and economic development while also significantly influencing cultural identity and national representation. Consequently, education is regarded as a pivotal catalyst for achieving the objective of the “great rejuvenation of the Chinese nation.” Pan *et al.* (2021) assert that China’s educational system does not uncritically replicate Western models. It carefully assimilates international educational concepts while preserving robust connections to its local cultural heritage, especially the fundamental principles of Confucian philosophy. This dual perspective illustrates China’s endeavours to reconcile heritage with modernisation, governmental authority with social participation, and global engagement with local identity.

Pan *et al.* (2021) systematically examine the culturally distinctive manifestations of Education for Sustainability (EfS) in Asian contexts, highlighting the interconnection between cultural tradition and pedagogical practice. The collection

argues for anchoring Education for Sustainability (EfS) in local cultural foundations rather than treating it as a universal paradigm derived from the West. In numerous regions of Asia—especially in Confucian societies—education has traditionally held substantial moral and political importance, frequently articulated through the ideal of nurturing virtuous individuals who enhance societal harmony and successful administration. Consequently, Education for Sustainability (EfS) in these situations must transcend mere knowledge transfer to involve learners in ethical contemplation regarding their connections with nature, society, and the self. The authors emphasise that Asian cultural traditions provide abundant ecological understanding. Confucian ideals such as *ren* (benevolence) and *li* (ritual propriety), Buddhist concepts of interconnectedness, and Daoist tenets of harmony and non-intervention all underscore relationality, holism, and respect for nature. Indigenous philosophies offer profound moral and intellectual foundations for Education for Sustainability (EfS), enhancing its cultural relevance and instructional significance. Pan *et al.* (2021) promote a critical pedagogy approach, emphasising that Education for Sustainability (EfS) should extend beyond modifying individual behaviour to empower learners to examine and contest the structural factors contributing to environmental degradation. This strategy promotes cognitive involvement and the ethical cultivation of ecological citizenship. Pan *et al.* (2021) ultimately examine the conflict between global educational policy narratives and local practices in Asia. The authors offer a “recontextualization” technique that amalgamates global issues with culturally particular values, allowing Education for

Sustainability (EfS) to promote both cultural identity and global ecological accountability. This viewpoint critiques the supremacy of Western paradigms while also affirming Asia's agency and intellectual contributions in redefining the future of environmental education.

This research is based on six interrelated theoretical underpinnings, offering a thorough and culturally contextualised framework for analysing environmental education in Guizhou and Scotland. The constructivist learning theory emphasises the significance of learners' active participation and interpretation in educational processes, highlighting the value of context and experience. Ecological systems theory highlights the dynamic connections between individuals and their complex settings, providing a comprehensive view of how family, school, community influence educational methods, and larger cultural-political systems. Curriculum theory facilitates a critical examination of the incorporation of environmental concerns into formal education, connecting curriculum development with ideological and institutional frameworks. Holistic education promotes the amalgamation of intellectual, emotional, spiritual, and physical aspects of learning, situating ecological consciousness within comprehensive personal growth. The Confucian idea of harmony, particularly through concepts such as ren, li, and tianren heyi, offers a culturally ingrained ethical framework for nature and sustainability. At last, Xi Jinping's theory of Ecological Civilisation, along with perspectives from scholars such as Pan *et al.* (2021), demonstrates the reinterpretation

of traditional Chinese philosophical values within national narratives and governance structures, thereby institutionalising environmental ethics in policy and educational discourse. These ideas collectively provide a comparative analysis that is pedagogically informed and culturally nuanced, revealing how environmental education develops across different sociocultural contexts. Alongside these six interrelated theoretical foundations, this study also draws on ecopedagogy as a critical interpretive lens. While not treated as a formal framework explicitly adopted in either Guizhou or Scotland, ecopedagogy is used to illuminate questions of ecological justice, participation, teacher agency, and the transformative possibilities of environmental education across the two contexts.

Although ecopedagogy is discussed earlier in this chapter, it is not treated in this study as a separate formal framework alongside the six theoretical perspectives outlined above. Rather, it serves as a supplementary critical and interpretive lens for examining the extent to which environmental education in Guizhou and Scotland moves beyond knowledge transmission or behavioural guidance towards ecological responsibility, critical reflection, participation, and transformative learning. In this sense, ecopedagogy supports the comparative analysis by making visible both the possibilities and the limitations of culturally situated EE practices in the two contexts.

Chapter 3. Methodology

This chapter outlines the methodological structure of the study, which investigates how primary school educators in Guizhou Province (China) and Scotland (UK) conceptualise and implement environmental education. The study utilises semi-structured interviews as its principal data gathering method, employing Reflexive Thematic Analysis (RTA) to examine the qualitative data. The choice and implementation of these approaches are guided by a qualitative methodological framework that emphasises the thorough investigation of participant experiences and the creation of meaning within particular sociocultural contexts. This methodology is grounded in constructivist educational theory and Vygotsky's sociocultural learning theory, both of which underscore that learning is socially mediated and influenced by cultural contexts. These theoretical viewpoints are based on a social constructionist epistemology, which asserts that knowledge is not an objective reality to be discovered but is co-created through human interaction, language, and cultural practices.

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Alongside its social constructionist epistemology, the study is also informed by ecopedagogy in analytical terms. Rather than being applied as a formal framework for either Guizhou or Scotland, ecopedagogy is used here to orient the analysis towards issues of ecological justice, participation, teacher agency, and the extent to which environmental education opens up critical and transformative possibilities. It provides an additional perspective for interpreting how teachers in the two contexts understand, enact, and negotiate environmental education within their respective cultural and institutional settings.

This chapter presents a coherent explanation of the research design by adhering to Crotty's (1998) four-part framework: epistemology, theoretical perspective and methodology, and methods. Crotty asserts that these four elements must be explicitly defined in any research process to guarantee conceptual clarity and methodological consistency. The chapter commences by describing the study's epistemological basis

in social constructionism, thereafter addressing its theoretical and methodological framework. The text subsequently elucidates the comparative research strategy and the justification for choosing Guizhou and Scotland as analytical units. The following parts outline the empirical methodologies, encompassing sampling strategy, data collection, and data analysis via RTA, before concluding with views on study quality and ethical implications.

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3.1 Epistemology

As a branch of philosophy that refers to knowledge, epistemology is described as a way of observing the world and apprehending it (Al-Ababneh, 2020). Maynard (1994, p.10) described that by building a philosophical foundation, epistemology can be used to discuss and answer questions such as how knowledge exists and how we can ensure its accuracy and rationality. To identify, explain and justify the epistemological position research has adopted, Crotty (1998) listed the primary types of epistemology, such as objectivism, constructionism, and subjectivism. The main tenet of objectivism is that reality exists independently of consciousness, that human beings have direct contact with reality through sensory perception and acquire objective knowledge from the process of concept formation and inductive logic through sensory perception. Crotty (1998) explains that in the objectivist view, humans discover a meaning that has been there waiting for them; understanding and value are considered to exist objectively in the crowd of people we study, and if the researcher conducts the study in the right way, objective truth can be discovered. According to Rand (1990, p. 5), an objectivist epistemological position holds that all knowledge is based on perception. Rand considered that the validity of the senses is axiomatic and that physiologically determined perception cannot be wrong. This philosophical system, developed by Ayn Rand, began with three axioms: existence, consciousness, and identity. She defined an axiom as:

A statement that identifies the base of knowledge and of any further statement pertaining to that knowledge, a statement necessarily contained in all others, whether any particular speaker chooses to recognise it or not. An axiom is a proposition that defeats its opponents by the fact that they have to accept it and use it in the process of any attempt to deny it.

(Rand, 1992)

The objectivist philosopher Leonard Peikoff (1991, p. 11) pointed out that Rand's definition of axioms is to prove that existence, consciousness, and identity are axioms and are the basis of knowledge, so they are inevitable. However, she did not prove whether they were true. Rand (1996) believes that existence is an entity with a specific nature composed of particular attributes. Therefore, it does not exist, nor can it exist without essence or attributes. Regarding consciousness, Rand (Peikoff, 1991, p. 5) believes that it is the ability to perceive existence. Therefore, existence is the prerequisite of consciousness, and consciousness must conform to it. For example, an illusion is a recognition error in the concept of what you see. It is not an error of vision itself (Kelley, 1986). It is worth noting that Rand (1961, p 64) believes that feeling cannot be used as a source of knowledge. She insists that emotion is the reaction of a conscious or subconscious thought that a person has accepted, rather than a means to realise the cognition of reality. Objectivist epistemology has also received some criticisms. Randall Dipert (1987) and Rodreick T. Long (2000) pointed out that

objectivist epistemology confuses the perception process that forms judgments with the way to prove judgments.

In another epistemology, constructionism assumes that scientific knowledge is constructed by the scientific community. According to the constructivist, natural science consists of mental constructs that aim to explain sensory experience and measurements. Constructionism believes the world is independent of the human mind, but the knowledge that exists in the world is always constructed by humans and society (Crotty, 1998). Constructionism rejects the objectivist philosophy, which holds the idea that humans do not have to know the truth about the world through scientific approximations that have different degrees of validity and accuracy. Macquarrie (1973, p. 57) interprets that even if there were no humans, there might still be galaxies, trees, rocks, etc. The world existed before humans came along, but it was not meaningful. It was only when man created meaning that it became a meaningful world. Constructionism is therefore the view that all knowledge, and all meaningful reality, begins with human practice, is constructed from human beings interacting with their world, and develops and spreads within an essentially social context (Crotty, 1998). For constructionists, objectivity and subjectivity need to be combined, and they are inseparable. As Crotty (1988) explains: *“no object can be adequately described in isolation from the conscious being experiencing it, nor can any experience be adequately described in isolation from its object.”* Therefore, constructivist

intentionality begins with an interaction between subject and object, exhibiting the interaction of human beings with their human world. Meaning is then born out of this interplay.

Critics criticise constructivism because it is reductive relativism. Because constructivism holds that the concept of truth is socially constructed, society is also relative. This perception leads to the notion that if what is considered “truth” is associated with a particular social formation, then the concept of truth itself can only be considered “true” within that society. In another social formation, “truth” may be wrong. There are also criticisms of the possibility of the simultaneous existence of truth and falsity in constructivist epistemology. Another criticism is that constructivism holds that the concepts of two different social forms are completely different and incommensurate. Since this is the case, it is impossible to make statements, comparisons and judgments based on each worldview. Because the criteria for judgment itself must be placed on a particular worldview, the question arises as to how to establish the truth or falsity of any statement in a different worldview.

As Fish (1990) emphasises, all objects are made, not found, while the means of making them are social and conventional. We have been embedded in institutions that precede our existence, and it is only through being present in them or occupied by them that we can access the public and conventional meanings they produce. These

institutions are the source of the interpretative strategies by which we construct meaning. Fish calls these institutions “a publicly available system of intelligibility”. Geertz (1973) has a similar perspective to Fish (1990), but he focuses on culture, noting that as a direct consequence of the way humans have evolved, we rely on culture to guide our behaviour and organise our experiences. He argues that people should reverse the way they regard culture, by seeing it as a source rather than a consequence of human thought and behaviour. For him, human thought is essentially both social and public. However, Crotty (1998) argues that it would be misleading to describe humans as participating with their world and making sense of it. As we are all born into a meaningful world in which publicly available systems of intelligibility prevail in the social environment, when we first see the world in a meaningful way, we inevitably carry a tinted lens that our culture has given us; our vision is not complete, and we may ignore other things because of it. Crotty emphasises that constructionism encompasses the full scope of meaningful reality and that all meaningful reality is socially constructed.

To clarify the construction of social reality, Greenwood (1994) makes a distinction between physical and social phenomena. He explains that objects (such as chairs) can exist independently while we know they exist, and our knowledge of their existence does not constitute their existence. The observation of social rules in any social situation by all those involved in social interaction constructs and sustains social phenomena.

The natural world does not constitute its own “meaning”; its meaning is produced by people in real life, as a result of their efforts to understand or interpret it for themselves (Giddens, 1976). This research as a social science category, is a cross-cultural qualitative study focusing on environmental education practices, subscribing to the social constructionism epistemological view of knowledge construction. The social nature of science advocated by social constructionism is also an important theoretical support for this research.

Social constructionism is particularly suitable for this study, which aims to comprehend how primary school educators in Guizhou and Scotland conceptualise and implement environmental education within their distinct cultural and institutional frameworks. This epistemological perspective posits that knowledge is not an inherent universal reality but is generated through social processes, language, and historical context (Berger & Luckmann, 1966). It corresponds effectively, intending to analyse teachers’ interpretations, which are influenced by their lived experiences, national curriculum, professional standards, and sociopolitical contexts. Furthermore, constructionism complements the use of Reflexive Thematic Analysis (RTA), which assumes that meaning is not embedded in the data itself but emerges through the researcher’s active engagement with the data (Braun & Clarke, 2006; Braun & Clarke, 2021). This interpretivist approach allows for the inclusion of both semantic and latent

meanings, and supports critical reflection on how the researcher's own position influences knowledge construction (Clarke & Braun, 2014).

Environmental education is fundamentally a socially constructed field; its significance, objectives, and teaching methods differ throughout cultures and are integrated into wider discussions of development, citizenship, and sustainability (Stevenson, 2007). Acknowledging this social and cultural contingency, a constructionist perspective allows this study to regard teacher narratives not as permanent knowledge but as contextual, negotiated interpretations that include many institutional logics and cultural values. This coherence between epistemology and methodology guarantees that the research approach is logical and philosophically substantiated, facilitating a comprehensive understanding of how environmental education is conceptualised and implemented in two disparate sociocultural contexts.

3.2 Researcher Positionality and Reflexivity

As a researcher raised and educated in China, I bring to this study a close familiarity with Chinese cultural values, educational traditions, and the lived realities of schooling. My own experience of growing up within the Chinese education system shaped not only my understanding of how education is organised and experienced, but also my sensitivity to the social, moral, and cultural assumptions that underpin educational practice. These experiences informed my interest in environmental

education as a field that is never simply pedagogical, but is also deeply embedded in broader understandings of human–nature relations, moral development, and social responsibility.

My subsequent academic study in the United Kingdom further reshaped this perspective. Working across Chinese and British educational contexts made me increasingly aware that educational ideas are often interpreted through culturally specific frameworks, and that misunderstandings can emerge in both directions. At times, Western academic readings of Chinese education may be shaped by Eurocentric assumptions that oversimplify the complexity of Chinese educational thought and practice, including in relation to environmental education. At the same time, understandings of Western education within Chinese contexts may also be partial or idealized. This mutual possibility of misreading is especially significant because the Chinese education system itself has not developed in isolation, but has long incorporated and adapted elements associated with Western educational traditions, including examinations, subject-based curricula, and forms of ranking and assessment.

These layered connections gave me a valuable comparative position from which to consider both difference and overlap across the two contexts. As a bilingual researcher with familiarity with both Chinese and UK educational settings, I was able to engage with participants' accounts in both Chinese and English and to attend

carefully to the cultural and linguistic nuances embedded in their descriptions of practice. At the same time, I remained aware that my own familiarity with the Chinese context, and my academic formation in the UK, shaped how I interpreted policy, pedagogy, and educational values. Rather than assuming one context should be understood through the terms of the other, I approached this study as an effort to represent environmental education in Guizhou and Scotland as contextually grounded practices, while also exploring where mutual learning, critical reflection, and constructive dialogue might be possible. In this sense, my positionality did not sit outside the research process, but actively shaped how questions were framed, how interviews were interpreted, and how themes were developed across the two settings.

3.3 Comparative Research/ Approach

In this section, the theoretical rationale for comparative research will be demonstrated. The reasons for choosing a cross-national, cross-cultural aspect of this research will be explained at the end, based on the previous rationale.

As a start, a simple definition of comparative research will be given here: that is, the act or idea of comparing two or more things or objects to show how the two or more objects are similar or different. Comparing things has been used by researchers for a long time as a necessary condition for basic scientific and philosophical inquiry

(Bukhari, 2011). This form of research began to emerge in the 1880s and gained popularity after World War II. Comparative research is used to identify and quantify the relationship between two or more variables (Bukhari, 2011). Comparative research plays a central role in concept formation as it brings into focus the similarities and contrasts inherent between cases or objects (Bukhari, 2011). It highlights the role of description. Comparative research is also used to test hypotheses and can contribute to the inductive discovery and theory building of new hypotheses (Bukhari, 2011). Thus, comparative research can also be necessary to achieve more advanced research. Researchers analyse significant differences in things from comparative studies and highlight them from multiple perspectives in order to draw conclusions. Bukhari (2011) believes that when a researcher is able to explain the differences between things under study, the research will be able to strengthen their position and focus on the main arguments of their research. Moreover, in *Scientific Investigations in Comparative Education*, it is mentioned that attention should be given to the systematic testing of hypotheses within a more general theoretical framework. It is necessary to avoid a priori assumptions about the nature of human beings and their institutions (Eckstein & Noah, 1969). Eckstein and Noah (1969) believe that facts in and of themselves are meaningless, for only in the context of explanation can facts take on significance.

Theisen and Adams (1990) classified the four types of research in comparative studies (Analytical, Descriptive, Evaluative and Exploratory) and summarised the

purpose of these four types of research and the typical research questions that primarily occur in comparative studies:

1) In the analytical type of research, the purpose of the study is to describe the roles, a description of the cause-and-effect relationship, or an explanation of the relationship and its consequences. The research questions that apply in this genre are: What are the explanations for relationships between components? Or why do actors or systems behave in the way they do?

2) In the descriptive type of research? In the descriptive type of research, the research purpose is to describe the phenomenon or condition. Or a description of the relationship between variables. The research questions in this type of research are: What is the status of the phenomenon? What are the relationships between variables?

3) In the Evaluative type, the research purpose could be judgment of the merit, value, or worth of any given program or technique. Or interpretations are useful for decision-making. The research questions in this type of research could be like: Is program A better or more cost-effective than program B? Is the program or policy appropriate for a particular context?

4) The last type is exploratory; its purposes are generating new hypotheses or questions, exploration of relationships and functions with potential for in-depth research. The typical questions in this type are: What issues pertaining to roles, relationships, and processes exist which are worthy of examination by

other modes of research? What models, paradigms, or methods might be useful in designing future research? It is noteworthy that in stating the certainty of relying on explanations to predict phenomena, Phillips and Schweisfurth (2006) argue that the certainty here is not absolute but constitutes a reasonable assumption.

Bukhari (2011) divided comparative study into two styles; one is descriptive comparison, which aims to describe or explain the invariance of the object; it does not aim to make changes in the object. Another style is normative comparison, which aims not only to test and explain, but also to improve the status quo of the object or to help improve or develop similar objects in the future.

In discussing the methods of applying comparative research, Phillips and Schweisfurth (2006) refer to the application of comparative study in the field of education, where researchers focus on other countries and cultures, on education “elsewhere” and on how comparisons can realistically be made (Phillips & Schweisfurth, 2006). Therefore, comparativists will use the research methods used by other social researchers in their research, and then add specific comparative tasks based on these established educational investigation methods (Phillips & Schweisfurth, 2006). To provide an overview of available comparative education methods, Phillips & Schweisfurth (2006) present the positions of two leading British comparative education

scholars, Edmund King and Brian Holmes. The two different positions reflect the problems that all social scientists are trying to solve: it has to do with the possibility, viability, and desirability of seeking to establish laws which will enable us to make predictions (Phillips & Schweisfurth, 2006). Some people, such as Holmes, believe that this is indeed possible, feasible, and desirable, while others, such as King, believe that human behaviour is unpredictable. In Turner's understanding, Holmes's position is that the study of the education system should be based on the laws of sociology, but Turner does not believe that the laws of sociology can be as specific as the laws of physics (Turner, 2004). King (1968) also believes that the laws of sociology are a hypothesis, or a description rather than a solution; it is just a hypothesis based on existing evidence. Moreover, Winch (1964) reminds researchers to be wary of the easy use of scientific forms as a paradigm for measuring other modes of discourse.

In relation to research design, Nowak (1977) suggests cultural equivalence, contextual equivalence, structural equivalence and functional equivalence. In general, comparative researchers need to establish equivalence in research, similar to constants and variables. However, some education systems are fundamentally different in terms of culture, context, structure, and function. Researchers seek explanations for the difference between "culture" and "background" through this lack of equivalence comparison (Phillips & Schweisfurth, 2006). Phillips (2006b) established a phased framework for comparative investigation, building upon the foundational work of

Bereday (1964). Figure 3.1 shows this approach, which delineates a sequential and reflexive method for executing cross-national educational comparisons. The model commences with the conceptualisation stage, which entails the creation of research questions that eliminate context-specific assumptions. Critical enquiries during this phase frequently encompass: “What is the essence of the phenomenon under examination?” The second level emphasises contextual description, when scholars meticulously delineate the educational phenomena in each country, encompassing its historical, geographical, cultural, political, religious, and linguistic contexts. The pertinent inquiry now is: “What is the status of X within the framework of Y?” The third stage entails the juxtaposition of cases, when the researcher detects and contrasts significant similarities and differences among the chosen scenarios. For example: “In what ways do A and B contrast or correspond regarding X, within the contextual framework of Y?” The fourth stage, hypothesis formation, seeks to elucidate differences or similarities by identifying underlying factors and proposing provisional causal links. The primary inquiry is: “What explains the observed discrepancies in X between A and B, in light of Y?”

The concluding phases encompass reconceptualisation and application, which entail reinterpreting the findings within other contexts and examining the degree to which the conclusions can be extrapolated or extended to alternative situations. These procedures are not strictly sequential but facilitate ongoing reflection and modification

during the research process. This methodology offers a structured yet adaptable framework for comparative education research, directing this study's exploration of the comprehension and implementation of environmental education by primary school teachers in Guizhou and Scotland.

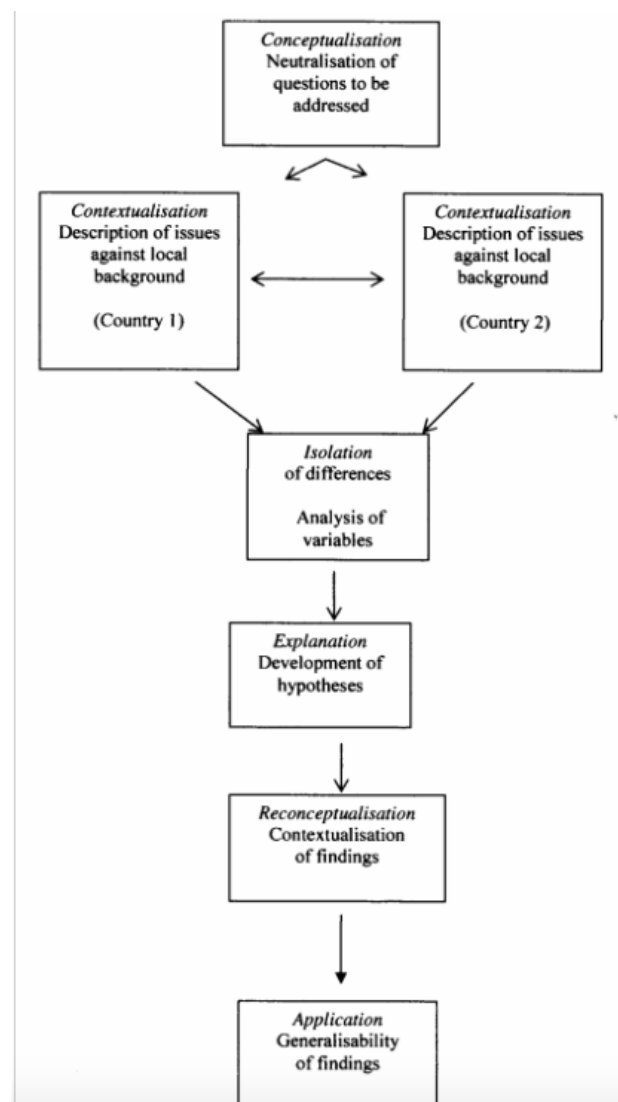


Figure 3.1. A structure for comparative inquiry. (cited in Phillips (b, 2006))

Phillips and Schweisfurth (2006) evaluated that this structure proposes a systematic comparison procedure. After a comprehensive investigation of the background, the variables to be investigated are separated and identified. Hypotheses

are formulated based on attempts at interpretation. Finally, the concept of analysis is revisited in accordance with the findings and the applicability of the findings is considered.

Guided by the above theories, this study aims to explore and develop the concept of environmental education in the hope of facilitating teachers in Scotland and Guizhou to learn from each other's environmental education practices, which is in line with the characteristics of a comparative study. In terms of research structure, this study falls within the normative comparison mentioned by Bukhari (2011), and, in the research design section, it also draws on the structural model proposed by Phillips. While focusing on differences in environmental education between Scotland and Guizhou, the study seeks explanations in relation to regional differences in culture, educational policy, and education systems.

More specifically, this study conducts comparison at the sub-national level, using Guizhou Province and Scotland as its two analytical units. Although the two contexts differ in scale and political status, both represent coherent educational systems with distinctive policy environments, curricular structures, and sociocultural traditions. The comparison does not assume direct equivalence between them; rather, it seeks to explore how environmental education is understood, enacted, and negotiated within two contrasting educational settings. The empirical focus of the comparison is on

primary school teachers' perspectives, reported practices, and professional interpretations of environmental education. In this way, the study compares not only policy frameworks, but also how environmental education is embedded in curriculum and pedagogy, what forms of resistance teachers encounter, and how teacher agency is exercised in response to local opportunities and constraints.

This study utilises Guizhou Province and Scotland as analytical units, drawing on Bray and Thomas's (1995) cube model of comparative education, which highlights the importance of specifying the level, location, and aspect of comparison. In this study, the level of comparison is sub-national, the locations are Guizhou Province and Scotland, and the aspect under investigation is environmental education as understood and practised by primary school teachers. More specifically, the study examines how environmental education policy is enacted in school settings, how it is embedded in curriculum and pedagogy, what forms of resistance teachers encounter, and how teachers exercise professional agency in negotiating these conditions. Guizhou, a landlocked and economically underdeveloped province in southwest China, offers insights into environmental education amid centralised curricular reform, ethnic diversity, and rural limitations. Scotland, a constituent nation of the United Kingdom with its own education system and Curriculum for Excellence (CfE), presents a contrast in curricular autonomy, ecological priorities, and teacher agency. Considering their differences in scale—one as a province and the other as a constituent nation—both

contexts represent coherent educational systems with internally consistent frameworks, rendering them appropriate for comparative examination (Bray *et al.*, 2014).

This comparison approach reinforces the overarching methodological and epistemological framework of the investigation. Grounded in social constructionism, the research proposes that environmental education is not generally defined but instead locally negotiated. Teacher narratives are regarded not as objective data points but as contextual accounts influenced by professional conventions, sociopolitical discourses, and individual beliefs. A comparative analysis enables the examination of how meanings manifest variably in different locations, while allowing for shared reflection and reciprocal learning across settings.

3.4 Empirical research

This section outlines the empirical component of the study, including participant selection and data collection procedures. The research draws on interview data from 27 primary school teachers working in Guizhou Province, China, and Scotland, UK. All participants were directly involved in the education of children aged 6–12 and were therefore well placed to reflect on how environmental education was understood and enacted in everyday school practice. In total, 19 teachers were interviewed in Guizhou and 8 in Scotland. Given the interdisciplinary nature of environmental education, participants were selected from a range of subject and professional backgrounds

wherever possible in order to capture multiple perspectives on the enactment of environmental education across different educational roles and contexts.

The Chinese participants were primary school teachers working in Guizhou Province in southwest China. They represented a broad range of subject areas, including Chinese literature, English, mathematics, science, physical education, music, and art, and had between 1 and 24 or more years of teaching experience. The sample also included variation in professional responsibility, with one participant identified as Head of School. This diversity was important because it enabled the study to explore how environmental education was embedded across different curricular areas and interpreted by teachers with varying levels of experience within a context shaped by centralised curriculum guidance, moral education, and regional diversity.

The Scottish participants were likewise drawn from a range of professional positions within primary education. In addition to classroom teachers, the sample included participants working in outdoor education, Learning for Sustainability, science and mathematics leadership, and senior management roles such as Principal Teacher and Deputy Head. Their professional experience ranged from teachers who had just completed their probation year to those with 30 years of experience. This variation enabled the study to capture how environmental education was interpreted not

only in classroom teaching, but also through leadership, whole-school development, and sustainability-focused roles within the Scottish educational context.

Data were collected through semi-structured online interviews conducted via Zoom. Each interview lasted between 30 and 45 minutes. The interviews were audio-recorded for transcription, and pseudonyms were used for all participants in order to protect confidentiality. During the interviews, I kept my camera on throughout, while participants were given the option to switch theirs off. This online format made it possible to conduct research across two geographical contexts while still allowing for conversational flexibility and in-depth discussion.

3.5 Data collection: semi-structured online interview

The use of interviews in this study allowed for an in-depth exploration of the research questions in order to understand how and why people constructed their ideas in particular ways, and how and why they made connections between ideas, values, events, opinions, and behaviours (Hochschild, 2009). As a medium through which people formulate and express their perceptions of cultural forms, interview questions were rarely neutral, regardless of how objective the interviewer attempted to be; however, through answering them, participants were able to demonstrate how they understood their social world and one another (Barker & Johnson, 1998). As this was a comparative study across cultures and geographical contexts, interviews provided

access to the distinctive perceptions and experiences of participants from different regions, enabling an understanding of how particular issues were presented and interpreted in different contexts.

According to Oppenheim (1992), interviews often achieve higher response rates because direct participation can offer greater motivation for respondents. Moreover, interviews enabled misunderstandings arising from differences in respondents' interpretations of questions to be addressed more effectively. Particularly when dealing with complex and open-ended questions, interviews were more advantageous than some other methods. As this research was qualitative in nature, a semi-structured design was adopted. According to Brinkmann and Kvale's (2015) definition of the semi-structured qualitative research interview, its purpose is to obtain descriptions of the interviewee's lifeworld in order to interpret the meaning of the described phenomena.

In contrast to structured interviews, semi-structured interviews allowed the interviewer to follow up on information deemed important and to make fuller use of the knowledge-producing potential of dialogue. They also created greater opportunities for the interviewer to act as an active knowledge-producing participant throughout the interview process, rather than simply relying on a pre-defined interview guide (Brinkmann, 2018). Following Edwards and Holland (2013), the semi-structured interviews in this study were organised around predetermined topics and several

guiding questions, while still allowing new ideas and follow-up questions to emerge during the interviews. The interviewer's phrasing and follow-up questions were adapted to each respondent's answers in order to help them feel as safe and relaxed as possible, while also encouraging more precise and in-depth responses. At the same time, the interviewer was able to ask respondents to explain the reasons behind their answers, which helped generate rich and accurate information (Keller & Conradin, 2020). Given that the respondents in this study came from two different countries (China and the UK) and spoke different languages (Chinese and English), it was important to remain aware that linguistic and cultural differences could lead to different interpretations of the same term. Therefore, the flexibility of the semi-structured interview enabled the interviewer to confirm respondents' meanings during the interview and, where necessary, ask them to elaborate further in order to ensure accurate understanding.

Interviewers did not prefer unstructured interviews due to the great flexibility and freedom they offer. Unstructured interviews did not have pre-arranged questions, and respondents will be free to express what they like without guidance from the interviewer, which may lead to worthless data collection (Bailey, 2008). In contrast, this research, as a comparative (cross-cultural) study, will compare teachers' different understandings of environmental education practices within the curriculum in both countries. Therefore, pre-determined questions will help set up the specific aspects that connect the practice of environmental education within the curriculum. Participants will

then be instructed to give particular explanations and teaching experiences so that the researcher can extract valuable information.

It is worth noting that all interviews for this study were conducted using Zoom or Microsoft Teams. Given the limitations caused by COVID-19, it was difficult for the researcher to travel between the two countries and conduct face-to-face interviews. Although the interviews were transferred to online, this study did not observe the facial expressions and physical appearance while being interviewed, but will only focus on what the interviewees say.

3.6 Reasons for using pseudonyms

Before the beginning of each interview, the researcher encouraged the participant to choose a pseudonym that would represent their identity in this research. A pseudonym is a name that a person assumes for a specific purpose, which is different from the person's original name (Allen & Wiles, 2016). There are two main reasons for applying a pseudonym: the first is the need to keep the personal information of the participants confidential (this will be discussed further in the ethics section below). The second reason is that the use of pseudonyms will help participants to answer the questions more comfortably and positively. According to Allen and Wiles (2016), giving participants the freedom to choose their preferred name can positively influence the interview process, as having participants pick their pseudonyms makes them feel

more respected than using a code name (e.g., Participant 1). Therefore, the researcher would be able to develop a positive relationship with the participant. In addition, participants could recognise that their own words contribute significantly to the findings because of the use of pseudonyms, which motivates participants to answer the questions positively.

3.7 Sampling

As an essential element of social research, sampling represents the action or process of data analysis, that is, the selection of a predetermined number of samples from a larger population (Cohen *et al.*, 2018). According to Bryman (2016), a sample is “the portion of the population selected for investigation”. In qualitative research, Robinson (2014) summarises the sampling process in four points: defining the sample universe, deciding upon a sample size, selecting the sample strategy, and finding the sample. He believes that this four-point approach is not sequential steps in a linear process, because the research design for each point will repeatedly affect the other three points. A study with high validity requires the researcher to continuously revise and calibrate between each point to finally design a coherent, achievable, four-point strategy that fits the research objectives (Robinson, 2014).

Firstly, in defining the sample universe, this research needs to consider both sample homogeneity and heterogeneity. Of the five types of sample homogeneity

summarised by Robinson (2014), the sample in this research is consistent with life history homogeneity, which can be described as homogeneity arising from participants having shared past life experiences. The sample for this research is primary school teachers in Guizhou and Scotland who have experience in teaching content related to environmental education, and these primary school teachers all deal with students aged 5—12 years old, so these teachers all have a common experience of educational practice. Meanwhile, as cross-cultural qualitative research, this study necessitates access to a demographically and geographically diverse sample, comprising individuals from various cultures, to facilitate comparisons and the identification of similarities and differences. By balancing the homogeneity and heterogeneity of the sample, the researcher can delineate the scope of the sample that is consistent with its research objectives and questions, and the research resources at the researcher's disposal (Mason, 2002).

Secondly, in all qualitative research, there is a strong case for monitoring the data collection process and carrying out the sample size within an agreed range based on theory or practicality (Silverman, 2010). Recruiting participants is a matter of unpredictable opinion, and if recruitment is more difficult than expected, the target sample size may need to be reduced. Conversely, recruitment may lead to more potential cases than expected; the researcher may consider expanding the target sample

size while maintaining the availability of resources, funding and time to keep up (Mason, 2002; Robinson, 2014).

Thirdly, in terms of sample selection strategy, this research will use snowball sampling (also known as chain sampling, chain-referral sampling or referral sampling). It refers to asking participants to recommend acquaintances who may be eligible to participate in the study, thus forming a ‘chain of referrals’ (Robinson, 2014). According to Brymen (2016), non-probability sampling is a technique in which the researcher selects a sample through subjective judgement rather than random selection. In non-probability sampling, not all members of the target population have an equal chance of being included in the study, but each unit in the target population has a known chance of being selected (Saunders *et al.*, 2009). Several forms of probability sampling and non-probability sampling are shown in Figure 3.2 below.

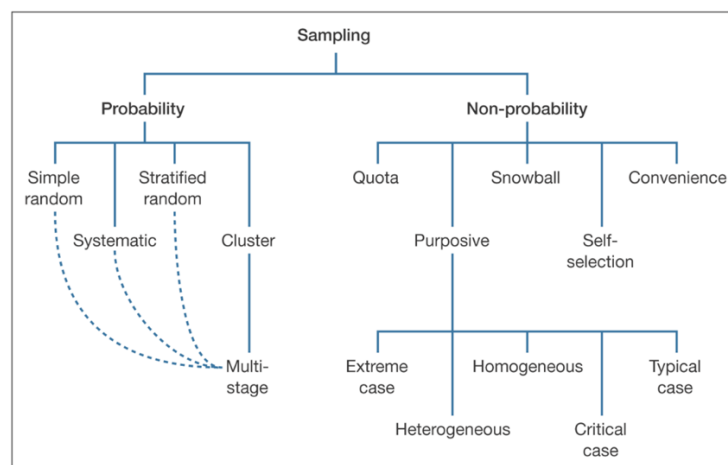


Figure 3.2. Types of sampling methods (Saunders *et al.*, 2009)

Snowball sampling was chosen for this study for two main reasons. Firstly, the researcher lacked acquaintance with primary school teachers in Scotland and Guizhou. The other reason is due to the limitations imposed by the COVID-19 pandemic. As an international student with no work experience, I had limited access to teachers in Guizhou. I faced challenges in travelling between countries, obtaining permission to enter schools for investigation, and finding teachers willing to participate in the study. According to Cohen *et al.* (2018), snowball sampling is the appropriate method for this difficult-to-reach sample situation. Considering the limited time available to collect data and the low likelihood of the COVID-19 restrictions being lifted within a few months, I believe that snowball sampling would be the most appropriate method for this study.

All teachers in both countries were personally contacted and were invited by the researcher via email. In the case of Guizhou, the researcher first contacted familiar primary school teachers via email to make initial contact with them and invite them to join the study. I also asked the participating teachers to recommend other teachers who might be willing to join the interview. The initial participants recommended teachers who may be colleagues, former colleagues, or teachers from different schools. I then contacted these recommended teachers via email to ask them if they would like to join. For the Scotland region, I contacted willing teachers via email and followed the same process as for the Guizhou region. This process continued until enough data had been

collected to develop a rich and analytically meaningful understanding of the research topic, at which point data collection ended.

3.8 Research quality

When conducting research, criteria must be developed to assess the quality of research. Reliability and validity are two criteria for testing and evaluating the quality of research. Reliability refers to whether the data collection techniques and analytical procedures reproduce consistent results if they are repeated in another setting or replicated by other researchers (Bryman, 2016; Joppe, 2000, cited in Golafshani, 2003). Validity is expressed in a variety of ways, including measurement validity, ecological validity, internal validity, and external validity. It relates to whether a research outcome measures what it is supposed to measure (Bryman, 2016; Joppe, 2001, cited in Golafshani, 2003). In short, reliability represents the consistency of the measurement, while validity represents the accuracy of the measurement.

3.9 Credibility

Credibility refers to confidence in the veracity of the data and its interpretation (Lincoln & Guba, 1985). The more credible a study is, the more it confirms the reader's belief in the researcher's correct understanding of a social phenomenon. Therefore, credibility refers to the degree of reliability of the research findings. Lincoln & Guba (1985) believe credibility is the most basic criterion for assessing the quality of

qualitative research. Bryman (2016) argues that more than one method is needed to collect data, and Lincoln & Guba also recommend several strategies to increase credibility, such as applying long-term participation and using data collection triangulation. However, due to the limitations caused by Covid-19, research human resources and time also place limitations on the study; this research will ensure credibility mainly through two methods: A). Adequate and reliable reference material. B). Frequent reporting to the researcher's supervisor.

3.10 Ethical considerations and limitations

This study rigorously complies with the ethical principles of social scientific research, emphasising the protection of participants' rights, the assurance of data confidentiality, and the mitigation of any hazards. Prior to the initiation of interviews, all potential participants received an information sheet detailing the study's purpose, procedures, and their rights. They were given a minimum of one week to contemplate voluntary involvement. Participants who consented were requested to electronically sign an informed consent form, affirming their voluntary decision.

Pseudonyms were employed during data collection, transcription, and analysis to safeguard participants' identities. Participants were prompted to select their own pseudonyms, a procedure that amplified their comfort during interviews and bolstered their sense of agency and respect within the study partnership (Allen & Wiles, 2016).

All identifying information, including actual names, educational institutions, and administrative jurisdictions, has been excised from transcripts and will not be included in any published materials. The correspondence between pseudonyms and actual names was maintained in a distinct encrypted file, accessible only to the researcher.

Audio recordings and transcriptions were securely stored on the researcher's hard drive with encryption. Only the primary and secondary supervisors had access to the anonymised transcripts. In accordance with university policy, raw data will be retained for ten years following the completion of the research and then permanently deleted.

Recognising that the interview process may address instructors' professional reflections or potentially sensitive experiences, various measures were implemented to mitigate emotional or psychological distress. At the outset of each interview, participants were advised that they might omit any question or discontinue the session at any moment without justification. Additionally, they were afforded the opportunity to examine their whole transcripts within a week of receipt and might suggest amendments or elucidations. They were reminded that they retained the right to withdraw their data at any time before publication, but withdrawal during the later stages of the research may be limited.

Owing to the global nature of the research and travel limitations imposed by the COVID-19 epidemic, all interviews were performed online using technologies such as Zoom and Microsoft Teams. This format restricted the researcher's capacity to perceive non-verbal signals, such as facial expressions and body language, yet it allowed participants to stay in familiar and secure settings, thus improving both accessibility and physical safety. To cultivate rapport and ensure clear communication, the researcher maintained their camera activation during interviews, while participants were permitted to deactivate theirs.

The study acknowledges its inherent limitations. While online interviews were essential, they may have diminished the profundity of engagement. Although the researcher was proficient in both Chinese and English, cultural and linguistic disparities continued to pose possible problems in interpretation. The implementation of snowball sampling—suitable due to the challenges in participant accessibility—may have resulted in bias within the sample composition. These restrictions were alleviated by meticulous attention to data quality, iterative reflexivity, and thorough recording of all research techniques to guarantee transparency and reliability.

3.11 Data analysis

This research used NVivo (a qualitative data analysis computer software package produced by QSR International) to analyse data. This study utilised Reflexive Thematic

Analysis (RTA), as developed by Braun and Clarke, to evaluate the qualitative interview data gathered from teachers in Guizhou and Scotland. RTA is a flexible yet stringent methodology for identifying and understanding patterns of meaning within datasets, particularly effective in examining how humans comprehend and formulate concepts within their social and cultural contexts. Considering the research objective of investigating teachers' conceptualisations of environmental education and their reflections on pedagogical practices, RTA was selected for its capacity to capture subjective interpretations and context-specific insights. Furthermore, RTA corresponds with the study's constructivist epistemology, acknowledging the researcher's active role in collaboratively building meaning from the data instead of perceiving themes as objectively discernible things (Clarke & Braun, 2014). RTA is exceptionally appropriate for research aimed at exploring participants' subjective experiences, meaning-making, and pedagogical practices, as it offers a flexible yet rigorous approach for identifying, analysing, and interpreting patterns of meaning within qualitative data (Clarke & Braun, 2014).

In contrast to coding reliability methods associated with a positivist epistemology, RTA highlights the researcher's active involvement in data interpretation, facilitating the development of themes that embody both semantic and implicit meanings in participants' narratives (Clarke & Braun, 2014). A key characteristic of RTA is its theoretical adaptability. It is applicable across several paradigms and is not limited to

any particular epistemic perspective (Clarke & Braun, 2014). This study was grounded in a constructivist perspective, which perceives knowledge as socially and contextually created. Significantly, RTA facilitates both inductive and deductive analytical approaches, rendering it particularly advantageous for exploratory research in culturally diverse contexts. Due to the scarcity of research contrasting Chinese and Scottish environmental education practices, an inductive Reflexive Thematic Analysis facilitated the development of ideas directly from participants' perspectives, rather than enforcing a pre-established theoretical framework. Within this analytical process, the interpretation of themes was informed by ecopedagogical concerns where relevant, particularly in relation to how teachers framed environmental responsibility, participation, agency, and the broader purposes of environmental education. Rather than being used to impose a fixed framework on the data, ecopedagogy served as a critical point of reference when considering whether teachers' accounts pointed primarily towards knowledge transmission, moral cultivation, curricular compliance, or more participatory and transformative forms of environmental learning.

Moreover, RTA facilitates the examination of diverse data kinds and scales, ranging from small case studies to extensive datasets, and has been effectively utilised in research across education, health, and psychology (Clarke & Braun, 2014). These characteristics collectively render RTA an optimal method for examining how

educators in two culturally disparate locations perceive sustainability, curriculum priorities, and pedagogical approaches in environmental education.

Nowell *et al.* (2017) contend that RTA offers a robust framework for ensuring trustworthiness in qualitative research by mapping its six analytical phases onto the four criteria of credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985). For example, credibility is enhanced through immersion in the data and the iterative generation of codes; transferability is supported through rich contextual description; dependability is addressed via clear documentation of the coding process and thematic development; and confirmability is reinforced through reflexive journaling and audit trails that make analytical decisions transparent.

The six phases of RTA were followed systematically (Nowell *et al.*, 2017). First, during familiarisation, the researcher read and re-read the transcripts to gain an in-depth understanding of each participant's account. Second, initial coding involved inductively identifying salient features of the data relevant to the research aims. Third, themes were searched by clustering related codes into meaningful patterns. Fourth, these themes were reviewed and refined to ensure they reflected both the depth and breadth of the dataset. Fifth, each theme was defined and named, clarifying its scope and analytical significance in relation to the research questions. Finally, the sixth phase involved producing a report, in which themes were contextualised and supported by

participant quotes, thus grounding the analysis in the lived experiences of the teachers. Throughout the process, reflexivity was consistently practised to mitigate personal bias and ensure analytical integrity. By maintaining a detailed audit trail, engaging in iterative reflection, and ensuring alignment between the data, codes, and final themes, this study meets the trustworthiness standards of qualitative inquiry. As Nowell *et al.* (2017) highlight, RTA's strength lies in its capacity to balance structure and interpretive creativity, offering a methodologically transparent yet theoretically rich approach to analysing qualitative data in comparative, cross-cultural contexts.

Chapter 4. Finding and Discussion

This chapter presents teachers' understandings and perceptions of environmental education in Guizhou Province, China, and in Scotland. In this chapter, critique is understood not as the application of a single critical theory framework, but as a reflexive analytical practice. It is used to examine how environmental education is shaped by cultural values, institutional structures, policy priorities, and teachers' lived professional conditions. This distinction matters because the purpose of the comparison is not to evaluate Guizhou and Scotland against one universal model, but to understand how each context enables and constrains particular forms of environmental learning. Drawing on the positionality discussed in Chapter 3, I approach the Chinese case with both cultural familiarity and critical distance, while also avoiding the assumption that Scottish autonomy, participation, or Learning for Sustainability are automatically more progressive. The analysis therefore seeks to apply critical depth to both contexts by asking what each makes possible, what it limits, and what new insights emerge when they are placed in dialogue. To do so, the chapter examines teachers' classroom practices, students' responses, institutional and professional support, implementation challenges, and teachers' expectations for the future of environmental education.

4.1 Ecological Civilisation in Practice: A Multi-Tiered Analysis of Environmental Education in Guizhou Province, China's Primary Schools

This study used Reflexive Thematic Analysis (RTA) of nineteen comprehensive interviews with primary school teachers in Guizhou Province, uncovering a unique perspective on environmental education that diverges from knowledge-centric or skill-oriented interpretations. Teachers characterise environmental education as a moral, cultural, and life-centric pursuit. Three principal themes emerged: (1) Environmental education is perceived as an extension of moral and civic education, emphasising individual discipline and social responsibility; (2) Educators fervently support embodied and experiential pedagogy, incorporating environmental awareness into daily practices and concrete school environments; and (3) Environmental education is profoundly rooted in Chinese traditional values, particularly Confucian ethics, through which educators reframe the relationship between humans and nature in culturally significant manners. Guizhou instructors perceive environmental education not as an isolated subject but as a collection of values to be embodied, experienced, and articulated by daily life, moral considerations, and symbolic expressions. This culturally rooted and ethically significant vision embodies a “pedagogy of embeddedness” that corresponds with China’s overarching ecological civilisation narrative, while providing a localised, relational, and integrative framework for fostering environmental consciousness in children.

4.1.1 Embedded Environmental Education through Moral and Curricular Channels

In primary schools in Guizhou, environmental education (EE) is not delivered as a standalone subject but is widely embedded within existing subjects and moral education activities. Teachers from various disciplines are involved, with instructional strategies primarily focused on integrating environmental awareness into pre-existing curricular content. This embedded approach was consistently reflected across interviews with participating teachers, illustrating a curriculum integration logic shaped by institutional and policy-driven guidance.

Before analysing teachers' reports on EE pedagogies used in the classroom, it is useful to present what the process of implementing environmental education policies in Guizhou looks like from the teachers' perspective. This section will demonstrate the function and impact of departments within the school on implementing environmental education policy. The reports of teachers participating in the study showed that there were two functional departments in the school, the Academic Affairs Office and the Teaching and Research Groups, which were highly related to teachers' teaching activities. These two departments were crucial to implementing education policies.

The functional structure is the same in all primary schools in Guizhou. The school's Academic Affairs Office is the functional department of the school's teaching management. It is mainly responsible for school teaching operation management, teaching quality management, teaching development management (such as teachers'

teaching tasks, objectives, progress and plans, students' learning requirements, objectives, plans and examinations), practical teaching management, teaching reform research, among other functions.

The school's Academic Affairs Office is the first to be exposed to the education policy, which organised teachers to study and discuss the policy. This process may take place within the school, in collaboration with the teaching and research groups of different subjects, to discuss how to implement the policy and how to change the school's teaching needs according to the policy's requirements. The Academic Affairs Office is responsible for leading, organising, evaluating, and supervising various teaching activities (Han, 2009). As a leader, the office will manage teachers' participation in various professional training; as an organiser, the administrative staff working in the office need to learn the policies first, then formulate and implement plans that are suitable for the school according to the specific conditions of the school, such as the number of teacher, teaching progress, school grounds; as an evaluator, the office needs to encourage every teacher involved in teaching activities, and spur teachers who do not meet the requirements; as a supervisor, the office will record and review the teachers' lesson preparation and teaching situation to ensure that the teaching content complies with policy requirements (Han, 2009).

The interviews with participants revealed that the Academic Affairs Office within each school plays a role in selecting teachers to go to the Education Bureau for training, organising teachers to carry out activities following policy requirements, and urging teachers to prepare lessons and give feedback on classroom situations. In addition, the office actively cooperates with all teaching and research groups in the school. Discussions within the teaching and research groups enable teachers to share teaching methods, experiences, and materials for implementing policies. These discussions are eventually fed back to the Academic Affairs Office to help the Academic Affairs Office formulate comprehensive teaching activity plans.

The Academic Affairs Office announces environmental education policies to all teachers in the school, which means that teachers of each subject can access the environmental education policy documents. This means that each teacher needs to reflect the policy requirements in their teaching. Through the work of the Academic Affairs Office and the Teaching and Research Groups, every teacher in the school knows that they need to add environmental education content to their teaching. Furthermore, teachers can find the connection between environmental education and their disciplines through the internal research of the groups.

In Guizhou primary schools, the implementation of environmental education (EE) begins primarily through teacher training and the administrative dissemination of

policy. Wang Yong, a mathematics teacher with 17 years of experience, explained: *“The school will arrange for some teachers to go to the education bureau for training. Then they come back and pass on the ideas to others.”* He also noted: *“The policy document will be issued by the Guiyang city government, and different schools interpret and implement it in their own ways.”* These comments reflect how EE is operationalised through top-down communication and cascade-style internal training, highlighting a pattern of pedagogical embedding shaped by administrative guidance.

This policy-aligned approach translates into highly standardised teaching practices. Zhang Xi, a Chinese language teacher with 12 years of teaching experience, stated: *“The teaching and research group has asked us to indicate about environmental protection in our lesson plans. Environmental topics are not taught separately; we usually integrate them into language or moral education classes.”* Her description illustrates the institutional expectation that environmental content be embedded within standard subject teaching, reflecting a moral-ethical mode of EE integration.

The Teaching and Research Groups in schools mainly help to improve the quality of teaching, promote the professional development of teachers, and promote the further deepening of the new curriculum reform (Xu, 2016). These groups help teachers establish a self-renewal-oriented personal learning system and a collaborative and shared team learning mechanism (Xu, 2016). The teaching and research group includes

a variety of school-based research forms, mainly including collective lesson preparation, case study, theme research, project research and network training (Xu, 2016). Through these collaborative research-based activities, teaching and research groups create closer connections between experienced and novice teachers, provide opportunities for professional dialogue, and enable the sharing of teaching resources and practical knowledge. Among these activities, theme research and project research appear to be particularly relevant to the implementation of environmental education policy. Theme research focuses on a specific teaching problem and is therefore problem-oriented, allowing teachers to respond to immediate classroom needs while also developing more targeted pedagogical strategies. This makes it an effective approach because it links policy expectations to concrete teaching challenges in a focused and manageable way. Xu (2016) argues that theme research emphasises relevance, inquiry, and efficiency in professional activities. By contrast, project research moves from practice to theory and back to practice, helping teachers transform general knowledge into their own professional understanding, experience, and pedagogical theory through the ongoing process of analysing and solving problems (Xu, 2016).

Every primary school establishes separate teaching and research groups for each subject. The Teaching and Research Groups are composed of teachers and focus on specific tasks that include:

- *Study the relevant educational guidelines, policies and instructions.*

● *Study the syllabus (also known as curriculum standards), teaching materials and teaching methods; study educational theories and scientific knowledge in conjunction with teaching.*

● *Summarise and exchange experiences in teaching and guiding extracurricular activities.*

(Liu *et al.*, 2022)

In terms of content, Lu, a science teacher with 24 years of experience, explained: *“The science teaching and research group requires us to osmose EE into our teaching. For example, I collect images and let students watch videos, then simulate environmental conditions in class.”* This indicates how curricular materials and teaching tools are used to support environment-themed instruction, often anchored around specific textbook references, aligning with: Curriculum Anchoring through Textbooks.

All participants mentioned that, over the past five years, environmental education (EE) content had become increasingly present in their daily lives through television, the Internet, communication with family members and colleagues, and their own teaching. Such everyday exposure to information formed part of teachers’ ongoing learning and training. This operated as an osmosis-style influence, through which teachers gradually developed environmental awareness and acquired knowledge of

environmental protection. As a result, they became more willing to teach environmental issues to their own students in similar ways. Having themselves learned this content as students, they often felt a stronger sense of responsibility to pass it on. In this sense, they viewed environmental education as an important legacy that should be transmitted to the next generation.

According to the Elementary Education Curriculum Reform Outline issued by the Ministry of Education of China in 2001, which set out requirements for curriculum structure at the elementary education level, primary schools offer subjects such as Chinese, Mathematics, English, Science, Physical Education, Music, Art, Morality and Ethics, Integrated Practical Activities, Information Technology, and Labour Practice. Since 2001, in line with the Ministry of Education's curriculum requirements for primary schools, local education bureaux have incorporated ideological and moral education, environmental education, health education, national defence education, and safety education into subject curricula in ways that reflect the characteristics of each subject. In 2003, the Ministry of Education issued a syllabus on environmental education for primary and secondary schools, through which environmental education was incorporated into thematic interdisciplinary education. In the same year, the Ministry of Education also issued the Guidelines for the Implementation of Environmental Education in Primary and Secondary Schools (hereafter, the Implementation Guide), which specified the objectives of environmental education at

the primary and secondary levels and suggested relevant teaching content and activities. In Guizhou, these policy documents have also served as an important basis for teacher guidance and training.

The Implementation Guide is one of the key policy documents on which teachers have focused in their professional learning. It identifies three objectives for environmental education at the primary and secondary levels: (1) emotions, attitudes and values; (2) processes and methods; and (3) knowledge and competence.

The Implementation Guide explains that the cultivation of emotions, attitudes and values focuses on creating context and opportunities for students to feel, experience and internalise them in a specific atmosphere and practical activities. Processes and methods refer to EE helps student to gain a comprehensive understanding of the environmental system and to acquire techniques and skills for identifying, solving and preventing environmental problems, including observing environmental phenomena in their surroundings, identifying problems, formulating hypotheses, developing investigative plans, collecting and collating information, taking action, reflecting and evaluating, communicating and expressing themselves. In the knowledge and competence section, the Guide explains in four parts: (1) natural ecology, (2) social life, (3) economics and technology, and (4) participation and decision making. The Guide elucidates that humans, nature and society interact with each other. In this process,

natural ecology provides the material basis for the survival of all life; social life encompasses lifestyles developed under different environmental conditions and their impacts on the natural environment; economy and technology determine how people use natural resources and provide goods and services; and participation and decision making reflect people's awareness of and ways to cooperate in solving environmental problems. Environmental education for sustainable development needs to help students to reflect on and respond to these dimensions to gain a comprehensive understanding of the interactions between human, nature and society, and their patterns and processes.

The participants were primary school teachers from multiple disciplines (Mathematics, Chinese Literature, English, PE, Science, Music, Cultivation of Morality and Rule of Law). The earliest experience with EE dates to 2000, and most teachers encountered EE content in the last 5-10 years. All of them have been exposed to information related to EE in their own lives, some when they were students. Despite subject differences, a shared logic of value transmission is present. Dai, who teaches both Chinese and English and has 5 years of experience, said: *"The school's Academic Affairs Office will organise activities, such as themed blackboard designs on environmental protection."* These value-oriented symbolic activities reflect moral-educational messaging embedded in broader school culture, supporting the theme: Value-Oriented Framing of EE.

emotions, attitudes and values	
Requirements	Suggestion activities
Appreciate the beauty of nature and respect the right of living things to exist.	Watching sunrise and sunset, blue sky, white clouds, blue water and green grass, listening to the singing of birds and the laughter of streams Recite ancient poems describing the natural environment and recognise the beauty of harmony between man and nature. The beauty of harmony between human beings and nature. Role-play: Experience the happy life of plants and animals in a healthy habitat. Role-play: Experience the happy lives of plants and animals in a healthy habitat.
Showing respect, care, and kindness towards others, and being willing to share happiness with them.	With the theme "If I were", Experience and discuss the importance of respecting and treating people from different geographical, social, economic and cultural backgrounds well. Group activities such as working together to create a picture of "Home in 2010".
Awareness of the difference between needs and desires, and appreciation of natural simplicity of life	Find out what life was like for your parents when they were young, give examples of needs in your own life, and compare and analyse what is necessary and what is not. Compare and analyse what is necessary and what is not.
Respect for the ways and customs of people in different cultural traditions in recognising and protecting nature	To share in different ways the cultural traditions of the different ethnic groups in the Chinese family, to learn to appreciate good cultural traditions, and to discuss the relationship between different cultural traditions and nature.
Recognise the environmental rights and obligations of citizens, actively participate in school and community actions to protect the environment, and dare to criticise behaviour that damages the environment.	To collect school rules and regulations on environmental health and environmental construction as well as national environmental laws and regulations, and to understand the contents and ways of realising citizens' environmental rights and obligations. To organise and implement actions to reduce waste at school or in the community.

Table 4.2 (cited in The Implementation Guide)

Table 4.2 demonstrates the systematic integration of environmental education into the primary school curriculum in China across the aspects of emotions, attitudes, and values. The educational methodology adheres to a triadic framework—connecting emotional appreciation, attitudinal growth, and behavioural involvement. Proposed activities encompass experiential techniques such as nature observation, role-playing, and reflective writing, in addition to civic-oriented duties like studying environmental legislation and coordinating school-based eco-initiatives. The framework demonstrates

a profound integration of ethical and environmental education, highlighting ecological consciousness with cultural heritage and civic duty. It embodies a value-oriented approach to ecological education integrated within Guizhou’s overall educational philosophy.

processes and methods	
Requirements	Activities suggestion
Use all senses to perceive the environment and learn to think, listen and discuss.	Through games such as touching trees and listening to the sounds of nature, they use all their senses to perceive nature and talk about their feelings.
Ask questions about the surrounding environment.	Ask each other questions while observing their surroundings on campus or in the community. Analyse and ask questions based on their own experiences and materials such as survey reports and media reports on the local environment.
Gather information about the environment and try to solve simple environmental problems	Designing solutions to ensure traffic safety on the way to and from school. Use everyday tools or simple instruments to check the condition of their surroundings. Use atlases and databases to collect information about the environment through observation of the neighbourhood and social studies.
Evaluating, organising and interpreting information, briefly describing the interactions between elements of the environment	Describe graphically the relationship between plant growth and the amount of water or degree of sunlight. Recreate the environmental conditions of the site through statistical charts or maps based on fieldwork.

Table 4.3 (cited in The Implementation Guide)

Table 4.3 delineates the “processes and methods” aspect of environmental education at the primary level, emphasising a spiral learning progression from sensory perception to systemic comprehension. The educational framework includes sensory engagement, inquiry-based questioning, information collection, problem-solving, and preliminary modelling of connections among environmental components. Proposed activities—including games, field observation, questionnaires, and data collection—progressively transition learners from emotional engagement to critical thinking and

analytical articulation. This student-centred, action-oriented methodology promotes active engagement and practical skill acquisition, cultivating environmental stewardship and the ability for systems thinking in genuine educational settings.

Overall, Tables 4.2 and 4.3 demonstrate a structurally ingrained value system underlying China's primary-level environmental education. The curriculum promotes emotional, ethical, and behavioural growth rather than solely presenting EE as a technical or scientific profession. This integration embodies a culturally grounded methodology wherein environmental education serves as a means for extensive moral development, harmonising individual accountability with national ecological discourses. The integration of affective education with procedural approaches enhances a pedagogy that prioritises character development alongside environmental knowledge, framing environmental education as a moral practice inherent in daily schooling rather than a separate subject.

Meanwhile, Feng Mike, a music teacher with 6 years of teaching experience, shared: *"When I was a little kid, my teacher told me to protect the environment. Now I say the same things. It's already part of my music class."* His remarks demonstrate that environmental ideas are often delivered in a behavioural framing across subject boundaries— *"We tell children to avoid plastic bags, to recycle, and behave properly."* This is coded as: Behavioural Framing of Sustainability

However, some teachers highlighted the superficial nature of environmental messaging. Li Hong, a mathematics teacher with over 20 years of experience, noted: *“The group asks us to reflect environmental awareness in our lesson preparation, but sometimes it’s just a sentence in the lesson. It’s symbolic.”* Similarly, Zhang Xi commented: *“Now I will emphasise the importance of garbage separation when it’s in the textbook, but there’s not much time to go deeper.”* These comments point to a performance-oriented model of EE that focuses more on appearance than depth, represented by: Symbolic vs. Substantive EE Presence. Together, these accounts indicate that environmental education in Guizhou is carried out through a policy-driven, value-based system of embedded practice. While this framework ensures widespread alignment with ideological and curricular standards, it also raises concerns about limited pedagogical autonomy, inconsistent teacher interpretation, and the superficial delivery of content.

The Guizhou case calls for a critical reading that remains sensitive to cultural meaning as well as institutional constraint. Its morally grounded and policy-aligned approach gives environmental education legitimacy and continuity within primary schooling. At the same time, this framing may leave less room for explicit ecological inquiry, student questioning, and discussion of the structural causes of environmental problems. The concern, then, is not with the presence of moral education itself, but with

the point at which moral framing begins to replace sustained investigation into ecological systems, social responsibility, and possibilities for collective action.

4.1.2 From Curriculum to Moral Education: An Osmotic Approach to Environmental Education in Primary Schools in Guizhou Province, China

This section explores the implementation of environmental education (EE) in Guizhou primary schools through an osmotic paradigm, which incorporates EE into existing topics and moral education activities rather than presenting it as a separate curriculum. Three interconnected themes emerged from teacher narratives and classroom practices, emphasising the contextual and value-based nature of EE in this setting.

In this study, “osmosis” is used as an analytical metaphor to describe the gradual and indirect ways in which environmental values, habits, and responsibilities are absorbed into everyday school life. The term helps to capture a form of EE that is not confined to a discrete subject, but transmitted through moral education, subject teaching, school routines, family expectations, and community practices. Used in this way, osmosis refers not simply to curriculum integration, but to a broader process of value formation.

This osmotic approach carries both pedagogical strength and analytical tension. On the one hand, it allows EE to enter pupils' everyday learning in culturally familiar and emotionally accessible ways. Through moral education, Confucian idioms, stories of harmony, visual materials, classroom routines, and home-school expectations, environmental responsibility is presented not as an isolated topic, but as part of a broader formation of conduct, empathy, and relational awareness. This gives EE a stable and affective presence in primary schooling, even when it is not taught as a separate subject. On the other hand, the same osmotic quality may also make environmental education less visible as a space for critical ecological inquiry. When environmental messages are mainly absorbed into moral cultivation and everyday behavioural guidance, there may be fewer opportunities for pupils to examine the structural, political, or economic causes of environmental degradation. This tension is important for understanding the ecopedagogical limits and possibilities of the Guizhou model: it creates culturally grounded environmental learning, but does not always make space for sustained critique, dialogue, or collective action.

Theme 1: Integrating EE into Subject-Based Pedagogy

Incorporating Environmental Education into Subject-Based Pedagogy Educators from several disciplines, including Chinese, Mathematics, and Science, consistently integrated environmental topics into their standard subject teaching. Rather than discrete training, EE principles are seamlessly integrated into books, mathematical

problems, and scientific experiments. This integration method embodies the "osmosis" concept and closely matches the national objective for cross-curricular environmental awareness.

Theme 2: Promoting EE through Experiential and Participatory Activities

Educators frequently employ Environmental Education (EE) through experiential learning initiatives, including themed days, eco-campus excursions, parent-student collaborations, and multimedia engagement. These methods aim to stimulate students' sensory involvement, emotional recognition, and behavioural responses, thereby strengthening the connection between ecological understanding and personal experience.

Theme 3: Reinforcing Environmental Consciousness through Traditional Cultural Values

Several teachers purposefully utilise idioms, proverbs, and classical texts grounded in Confucian philosophy to contextualise the relationship between humanity and nature. This cultural perspective not only situates environmental education within recognisable ethical frameworks but also facilitates the localisation of environmental consciousness in culturally meaningful manners, hence enhancing students' emotional engagement with ecological principles.

Theme 4: Merging EE with Moral Education

Environmental education in Guizhou is closely connected to moral education goals, often seen as essential to character development and civic responsibility. Actions such as resource conservation and maintaining public cleanliness are presented not just as ecological practices but as ethical responsibilities, demonstrating a unified moral-ecological education.

These four elements embody a holistic framework of value-oriented, culturally embedded, and systemically integrated environmental education. The RTA process demonstrated that instructors perceived EE not merely as technical knowledge to impart, but as a moral, emotional, and civic educational experience integrated into the daily classroom environment.

4.1.2.1 Integrating EE into Subject-Based Pedagogy

One of the most prominent features of environmental education (EE) practice in Guizhou primary schools is its osmotic integration into subject-based teaching. Rather than being delivered as a separate course, EE is embedded within disciplines such as Chinese, Mathematics, Science, and Art, forming a process of value-infused knowledge construction. This method corresponds with constructivist learning theory, which perceives learning as a process of meaning construction. Students interact with environmental concepts via established curricular frameworks. One example is from a

Chinese Literature teacher, Li Jing, who pays particular attention to finding environment-related content in literature, such as ancient poetry. Through a detailed appreciation of the explanation, Li Jing leads her students to understand the ecological situation hundreds of years ago and compare it with the current topography and ecological crisis. She said:

“Studying ancient poetry allows children to feel the beautiful natural scenery from the poet’s pen. In the process of feeling, I will infiltrate EE, which is actually to help children develop their environmental awareness. For example, in our ancient poem from LiBai,

*While both banks’ gibbons cry calls still unceasing,
Our light boat has gone by many fold mountains.*

Li Jing further explained:

*“I will ask the students: we all know that this poem describes the call of the apes on both sides of the Yangtze River. Now, if the wild animals like apes are extinct, we may not be able to feel the beauty of the scenery that the poet felt at that moment.”*She continued to add:

“From the perspective of modern literature, there is an article in the textbook called Four Seasons, which is a kind of article used to teach students to read. It is a progressive process from words to phrases to sentences. When teaching this article, I

asked the students what the scenery is like throughout the year and the differences. The students will describe to me some gorgeous scenery and experiences. I tried to expand, tell them that humans have caused some damage to the environment and caused many disasters. These disasters will appear in different seasons, so they are closely related to each of us.”

Zhang Xi, a Chinese language teacher, highlights how her subject offers rich opportunities for EE integration. She refers to the story *The Story of a Small Village* in the textbook. It is about a village that was flooded after heavy rain because the people in the village had cut down trees without any awareness of protecting the environment. In the end, the whole village disappeared.

“I told the children that cutting without careful consideration will degrade the environment and eventually endanger our own living environment, so they should be aware of the importance of protecting the environment.”

She also described an oral communication lesson titled *Us and the Environment*, where students investigate local pollution issues and discuss causes and solutions in class:

“In the first unit in Year 4, it is oral communication, and the topic is Us and the Environment. Before this lesson, I will ask the children to investigate what

environmental pollution is happening where they live, such as in their neighbourhoods or certain parts of the city. We will discuss together in class how all this pollution is caused and what solutions there are to improve it. In the process, I can teach them about environmental protection, such as what to do with food waste and what to do with the lithium batteries discarded daily. I will also ask them to observe whether the city's rivers, greenery, land and air are polluted so that the children can gradually develop an awareness of protecting the environment."

In another unit focused on animals, she teaches legal knowledge:

"In Year 4, Unit 3 is an animal theme, and several texts involve animals. When I explain these texts to children, I present them with some legal knowledge. For example, I tell them to care for and love the animals around them, tell them that endangered animals need our protection, introduce them to the Wildlife Protection Act, etc. We also learn about rivers and marine animals, and I tell them that there are marine conservation laws to protect these animals. I also show the children pictures and expand on some additional laws and regulations of other countries for them to hear about."

Deng Fenling, another Chinese teacher, shared her use of a text on tree planting:

"Children's behaviour must be cultivated early. When I talk about the text on tree planting, I discuss with the children, firstly, why do we need to plant trees? What is the

meaning of planting trees? Where are we going to plant trees? The children need to develop awareness by learning about these knowledges. Suppose the teacher does not actively infuse environmental protection content into the children's learning. In that case, the children will not understand how planting trees will benefit our society and the environment or the historical origins of tree planting. Once I taught them this content, they made a difference and could associate trees with releasing the oxygen we breathe and the items we use in our lives, such as disposable chopsticks made from the trees they consume."

Mathematics teacher Wang Yong observed that ecological content is increasingly embedded in successive textbook editions:

"I noticed that the math textbook I use not only has math content, but it also covers environmental protection, safety education and so on. In the 17 years I have been teaching, I have gone through three textbook editions, and I have noticed that with each edition, there has been an increasing focus on ecological education. In my regular teaching, I come across many exercises related to environmental protection. For example, there is a topic on oxygen emissions from broad-leaved forest leaves, and when I explain this topic, I will give students a lesson on planting more trees and not cutting them down. There are also exercises in the textbook that talk about water resources. Such as how many tonnes of water are needed to produce one tonne of steel, or how many tonnes of water are needed to produce one tonne of oil? I will combine

these topics to make students realise that we cannot live without water and tell them that our water resources are precious. We should work together to conserve water, protect it, and preserve the ecological environment of the source water. Of course, I will also mention some lakes and caves around our city. As these are already mentioned in the textbook, it is easier for me to expand on them.”

Science teacher Tian noted that his Year 6 science textbook includes an entire unit titled *The Environment and Us*:

“I do not need to deliberately combine my subject with environmental education content because it is already related to the environment. The textbook I am currently using has a whole section in Year 6 focused on the theme of The Environment and Us, which covers the environmental issues we face, the pollution of water resources and so on. There are also discussions on how to solve these environmental problems and use energy wisely to regenerate resources. There are also chapters with real-life case studies.” He also added: *“The textbook for the lower grades also includes experimental activities to observe plants and animals, mainly in relation to endangered animals, to sensitise children and ask them to care for the lives that live on this planet like us.”*

Liu Gang, another science teacher, mentioned a similar teaching scenario.

“I have two lessons a week, and I cover environmental protection in each lesson. When we were designing the syllabus, we found that the textbooks were full of nature-

related content. For example, I am teaching Year 5 students and the second unit is about earthquakes and the changes in rocks. When I taught this unit, I worked with the students to learn about the various forms of rocks and how the patterns of rocks are formed. Furthermore, I introduced a special section on volcanic eruptions and the effects of geological plate movements.”

These examples show how subject-based pedagogy helps normalise environmental education within the existing curriculum. In the Guizhou context, where teachers often work within a crowded curriculum and exam-oriented expectations, this form of integration allows EE to appear across literacy, moral education, science, art, and everyday classroom discussion without requiring a separate subject space. However, this also shapes the kind of environmental understanding made available to pupils. When EE is mainly attached to existing subject objectives, it may support awareness, care, and appropriate behaviour, but may not always develop into a more critical investigation of ecological problems. The key issue is therefore not simply whether environmental content appears across subjects, but whether such integration enables pupils to ask why environmental problems occur, who is affected by them, and what forms of social or collective response might be possible.

In conclusion, environmental education (EE) in Guizhou primary schools illustrates an osmotic model of curriculum integration—subtle, ingrained, and

systematically implemented through daily classroom practices. Instead of being presented as an independent subject, EE is integrated into fundamental disciplines such as Chinese, mathematics, and physics, creating a cohesive process of value transmission and knowledge building across disciplinary boundaries. The approach described above is closely aligned with constructivist learning theory, which asserts that learning involves active meaning-making. Students interact with environmental issues via contextualised learning activities integrated inside known discipline frameworks, rather than through abstract lectures. This promotes significance, autonomy, and an enhanced comprehension of human-nature interactions. The concept aligns with Bronfenbrenner's ecological systems theory, specifically the micro- and mesosystem levels. Classroom resources, instructor discourse, and curricular structures collaboratively influence students' ecological consciousness in a nested, dynamic fashion. The ecological rationale of learning thus arises from these divided, interconnected learning settings.

Moreover, holistic education is manifest within this concept. EE in this context goes beyond knowledge acquisition; it becomes a fusion of cognition, emotion, and moral consciousness. Students are not simply told to protect the environment—they experience, inquire, feel, and reflect. Interdisciplinary subjects and inquiry-based projects foster comprehensive development in intellectual, emotional, and ethical spheres. This osmotic, curriculum-to-values pedagogy exemplifies a distinctive

rationale within China's education system: environmental education as a culturally embedded, policy-directed moral pursuit. It embodies the broader vision of ecological civilisation as enacted through teacher agency, curricular adaptation, and daily pedagogical decisions, while also revealing the need for more explicit opportunities for critical ecological inquiry and collective action.

4.1.2.2 Promoting EE through Experiential and Participatory Activities

In primary schools across Guizhou, many teachers emphasised the use of experiential and participatory teaching methods to immerse students in real-life environmental contexts. These approaches aim to evoke students' sensory engagement, emotional resonance, and behavioural responses, thereby fostering internalised environmental awareness.

Teachers often create themed activities—such as Tree Planting Day, Energy-Saving Week, and World Water Day—that entail structured, contextually engaged involvement. Those practices reflect the constructivist learning principle that meaning is best constructed through experience.

“We have an annual Arbour Day at school”, - says teacher Shi - “We have a small garden in the school. On Arbour Day, we teach the students to plant trees and flowers.

We guide them to dig holes, apply fertiliser and water. We want students to appreciate what the books say about planting trees and how hard it is to plant them and look after them. After they have finished planting the trees, we ask them to record the process of planting the trees. When the trees have grown up, they are asked to observe the shape of the leaves and make drawings or bookmarks from the fallen leaves. A lot of the greenery in the school has been planted through activities like this.”These collective and expressive tasks allow students to process environmental content through multiple modalities, reinforcing internalisation through communication and collaboration.

Science teacher Liu believes that students are close to nature by their nature, and students are lively and playful, so he is happy to take students outdoors for activities. Through his associations, he has contacted professors at several local universities, bringing his students in small groups to lectures and visits to places where fruit trees and plants are grown. He invited scientists to introduce those trees and plants to the students. He explained that:

“The students are very motivated by this activity, and they barely wander off during the whole event. The plants in these universities and institutes are a mix of widespread crops, flowers, and trees, as well as some plants that are rare to see in life. I believe the students were able to notice more of the plants, and it inspired them to be interested in nature.”

This example strongly aligns with Bronfenbrenner's ecological systems theory, especially the concept that the microsystem—the immediate environment—plays a vital role in shaping students' development. By exposing students to unfamiliar yet authentic ecological spaces, teachers expand environmental learning beyond the classroom, fostering a genuine appreciation for biodiversity and sustainability.

Another teacher, Deng Fenling, also emphasised the impact of such embodied learning:

She says, *“Children's behaviour must be cultivated early. When I talk about the text on tree planting, I discuss with the children, firstly, why do we need to plant trees? What is the meaning of planting trees? Where are we going to plant trees? The children need to develop awareness by learning about these knowledges. Suppose the teacher does not actively infuse environmental protection content into the children's learning. In that case, the children will not understand how planting trees will benefit our society and the environment or the historical origins of tree planting. Once I taught them this content, they made a difference and could associate trees with releasing the oxygen we breathe and the items we use in our lives, such as disposable chopsticks made from the trees they consume.”* This approach aligns with constructivism and holistic education, which both emphasise the learner's active role in making sense of content through contextualised and value-based reflection.

Teacher Dai mentioned: “*We have asked students to create art on blackboards, collected drawings and hand-copied newspaper at school or grade level, and held class meetings where students discussed or gave presentations.*” This integrated approach signifies a transition from solely cognitive education to multimodal, experiential learning, when students interact with environmental content through creative expression and peer discourse. From a constructivist learning theory standpoint, such exercises enable students to externalise their comprehension—visually, socially, and reflectively—thereby enhancing both retention and personal engagement. Furthermore, these activities exemplify the Holistic Education focus on nurturing the “whole child,” integrating intellect, emotion, and social awareness. Producing chalkboard art or transcribing newspapers transcends aesthetic practice; it encourages pupils to reinterpret environmental challenges in their own terminology and visuals, promoting internalisation through agency and authorship. Class sessions, as noted by Dai, enhance dialogic learning, allowing students to express their perspectives and together develop mutual ethical insights regarding ecological stewardship.

Overall, these instances demonstrate that Guizhou teachers are not simply imparting environmental knowledge, but integrating it into practices that are experiential, sensory, and emotionally impactful. Learning transforms into an experiential process, rooted in physical activity and social context, integrating cognition and action in accordance with modern pedagogical theories.

In Guizhou's primary schools, environmental education often takes root not through explicit instruction, but through everyday interactions with the school's physical space. As Teacher Shi noted, *"We have a small garden in the school. A lot of the greenery in the school has been planted through activities like this."* This comment illustrates the intentional shaping of the learning environment to serve as an ecological space. The presence of a garden, maintained and expanded through student participation, represents not only a physical manifestation of sustainability but also a platform for sustained experiential learning. This practice resonates strongly with Bronfenbrenner's ecological systems theory, especially the microsystem, where children's immediate environments—classrooms, school grounds, daily routines—serve as powerful sites of behavioural formation. In this setting, nature is not merely a concept discussed in textbooks but a living presence with which students interact daily. They water, weed, and observe, and through these repeated actions, ecological awareness becomes embodied, not abstract.

Teacher Liu reinforced this perspective by highlighting students' roles in school and home maintenance. She described:

"I have done simple sewage treatment with my students. First, I asked them to collect a bottle of sewage in a plastic bottle around their neighbourhood and then filter it with cotton, gauze, a strainer and small grains of sand. The students then realised

that although this simple sewage treatment cleared the cloudy water, they found that they were using disposable materials, which created more waste. Therefore, they began to improve their method and started to find some recyclable materials. After this experiment, they told me they do not want to create new environmental pollution or waste resources by treating sewage. This is where they started to understand what sustainability all is about. Later, I started to make them aware of materials that can be recycled in their lives and encouraged them to look for details on these sustainable materials.”

“The students were given duties that urged them to clean their own classrooms, school grounds, and home. At first, parents were not in support of this, but as the semester progressed, the students started to actively notice and take responsibility for the environmental conditions in their surroundings. Parents observed a transformation in their children, which subsequently changed their attitudes. However, it is crucial for the youngsters to continuously do this work over a long period of time in order to cultivate the habit of being attentive to their surroundings.”

These practical engagements support constructivist learning theory, which suggests that knowledge is co-constructed through active participation in real-world contexts. Rather than learning about the environment in a detached way, students become co-creators of ecological meaning through care-based action. Furthermore,

these integrated approaches exemplify the holistic education paradigm, which prioritises the comprehensive development of the child—intellectually, emotionally, ethically, and spiritually. Environmental stewardship is not merely a singular “learning objective,” but rather a dynamic personal disposition cultivated through consistent experiences of care, attention, and presence. By consistently caring for plants and sharing responsibility for the environment, children cultivate relational awareness that connects the self, community, and nature. This approach acquires enhanced cultural importance within the framework of China’s ecological civilisation teaching. The establishment of “green schools” and “ecological campuses” has become an institutionalised component of moral and civic education, in accordance with national objectives of sustainable development. These educational approaches signify a paradigm shift from perceiving the environment merely as a subject to recognising it as a civic and ethical framework. Via these micro-practices, kids acquire an understanding of responsible ecological citizenship, not by merely reciting slogans, but by actively engaging with the land, their peers, and the natural cycles via everyday activities.

In this sense, the school transforms into a dynamic curriculum—an “eco-educational habitat”—where knowledge, emotion, and action converge. By nurturing a communal environment, students are given the opportunity to internalise environmental stewardship as a core aspect of their lives, rather than merely a fleeting educational pursuit.

Research frequently highlights the significance of familial role models (Arnold *et al.*, 2009; Monroe, 2003). Parents, educators, and other influential figures with an interest in nature can inspire individuals to engage with the natural world and subsequently advocate for its preservation. Studies indicate that children are more inclined to participate in environmental activities when their parents are actively involved or endorse and promote such involvement (Chawla & Cushing, 2007). Researchers have underscored the significance of children and adolescents socialising and enjoying themselves while interacting with nature. Young children inherently acquire knowledge about the environment through informal, spontaneous, and unrestrained play with peers (White & Stoecklin, 2008). For older children, the prospect of socialising and forming friendships can serve as a significant incentive to engage with nature and the environment (Arnold *et al.*, 2009).

Environmental education in primary schools in Guizhou extends beyond the classroom; it actively aims to bridge the gap between school and family, integrating learning into the microsystems of students' home environments. Several teachers highlighted how they encourage students to involve their parents in daily environmental practices, thereby reinforcing school-based values within family settings.

Lu stated: *“Occasionally, we guide the children to the community for practical activities, and the school also invites environmental specialists to provide lectures to the children. For instance, scientists are engaging in activities at the school. We will engage the children in practical environmental activities facilitated by the parents through the “Little Hands, Big Hands” programme. For instance, on Arbour Day, when the school initiates a program, parents will continue to take their children to purchase saplings and plant them in the specified locations. The majority of parents are willing to collaborate with the school and engage in these activities. I believe parental attitudes are progressively evolving. When I coordinate classroom activities, parents are eager to engage. Parents are concerned not only with their children’s academic performance but also with ensuring they enjoy a joyful childhood. When parents recognise their children’s enthusiasm for participation, the majority are inclined to cooperate.”*

This reveals a conscious effort to mobilise the mesosystem (Bronfenbrenner, 1979), where interactions between home and school shape a more unified learning environment. The “Little Hands, Big Hands” program represents not only an educational design but also a socio-ecological strategy—positioning children as bridges across institutional and familial systems.

Lu further acknowledges a key tension: some parents believe it will consume their children’s time, deeming it insignificant, and prefer their children to engage in other

interests. Lu articulated during the discussion that she recognises the significant influence of home education on students, stating: *“If we instruct our children on appropriate conduct in school, they may return home and exhibit contrasting behaviour, which poses a genuine issue.”* This disparate involvement underscores a fundamental challenge of school-based environmental education: despite institutional initiatives, home surroundings frequently serve as unpredictable factors influenced by varying family ideas, objectives, and capabilities.

Yet Lu proposes an active response to this challenge: *“I provide feedback on teaching and learning during parent-teacher conferences each semester, in addition to frequently engaging with parents to harmonise home and school ideally.”* *I will inform parents of the school’s obligations, including water and electricity conservation, the care of plants and animals, waste recycling, and the utilisation of public transportation. I anticipate that parents will endeavour to educate their children in accordance with the same standards.”* Here, the teacher is no longer a passive observer of home behaviour but an active agent attempting to harmonise two learning ecosystems. This aligns with Holistic Education’s principle of life-wide learning, encouraging the extension of schooling into family culture.

Media-centric initiatives also contributed significantly. Students were invited to produce videos highlighting their environmental initiatives and deliver remarks, which

not only engaged youngsters but also gained parental support. This kind of collaborative visual storytelling serves as a potent emotional instrument—it facilitates intergenerational discourse, highlights children’s autonomy, and cultivates familial pride. This bolsters the ecological civilisation narrative in China that advocates for "green families" and "comprehensive societal engagement" in sustainability initiatives.

However, not all results were optimistic. Teacher Wu acknowledged: *“I anticipated that the Little Hands Project would instigate transformative changes inside families... but the outcome was disappointing, as some parents continued to behave independently.”* Similarly, teacher Lijing observed that parental attitudes diverged significantly based on socioeconomic status, with more educated parents showing higher engagement in their children’s holistic development. Lihong echoed the need for school initiative, asserting that *“despite the indifference of some parents, there must be a synergy between schools and families, with schools undertaking greater responsibility.”* Her view reflects a constructivist concern: unless the values taught at school are reinforced in the home, children may develop conflicting understandings, resulting in fragmented moral learning. As Lu warns, *“If we instruct our children on appropriate conduct in school, they may return home and exhibit contrasting behaviour, which poses a genuine issue.”*

Finally, Lifei sharply noted the mirroring dynamic between children and parents: *“I believe that parental attitudes significantly shape children’s attitudes... If parents are uninterested, such as regarding the school’s environmental initiative, they may be reluctant to sign the letter, resulting in the children signing it themselves.”* This set of reflections demonstrates that while teachers are committed to integrating environmental education into family life, structural inequalities, cultural attitudes, and time constraints remain potent barriers. Thus, environmental education must be conceptualised not just as institutional pedagogy, but as a relational and negotiated process, where schools must be empowered to act not only as knowledge transmitters but as community facilitators and mediators of value conflict. From a policy and practice perspective, this means that environmental education should not aim solely to impart knowledge, but also to create synchronisation across life domains, especially between the formal system of schooling and the informal but influential space of the home. The goal, ultimately, is not only for children to learn sustainability—but for sustainability to be lived, observed, and modelled by everyone in their social ecosystem.

Teachers in Guizhou’s primary schools frequently incorporate documentaries, visual imagery, and film screenings into their environmental education efforts. Lifei said:

The school organised film events on various themes, including sand control, reforestation, waste management, and saving endangered animals. Some have a

storyline and are artistic dramas, while others are documentaries. After watching the films, sometimes we ask the students to write their afterthoughts, sometimes we discuss the film's plot with them and ask their feelings." This modality of instruction amplifies students' sensory and emotional engagement in the learning process. Instead of depending exclusively on verbal instruction, teachers facilitate student engagement through visual experiences and emotional responses, along with Holistic Education's focus on sensory integration and emotional growth (Miller, 2007). Viewing environmental films transcends passive observation; it is a contemplative process that integrates perception, intellect, and individual interpretation.

In a similar vein, Wu, an art teacher, defined her own practice:

"I would choose pictures to show them of the destruction of the environment or videos of animals who have had to start migrating to find new homes because their habitats have been devastated." She explained: *"I believe showing students these pictures and videos directly will have a bigger impact on the students. Hopefully, it will serve as a warning to remind students to take care of their home planet."*

This method is deliberately provocative and emotive. The chosen graphics frequently illustrate unsettling realities—such as deforestation, marine pollution, or species extinction—eliciting instant visceral responses. From a constructivist learning standpoint, these emotional stimuli serve as cognitive anchors: by observing

environmental deterioration, students are prompted to enquire “why,” relate their observations to their own actions, and investigate cause-and-effect linkages through structured reflection. Wu further noted:

“I would also ask students to share the pictures or videos with their parents. It is through the students that they will motivate environmental awareness among their parents.”

This suggests a ripple effect: the emotional and moral engagement of students translates into household conversations, gradually shifting family norms. In this sense, visual media becomes a bridge between school-based education and intergenerational environmental learning. Such a model exemplifies the “mesosystem” interaction described in Ecological Systems Theory (Bronfenbrenner, 1979), where linkages between school and home co-construct learning environments.

These initiatives also embody the overarching objectives of Ecological Civilisation education, especially the notion that environmental awareness should be nurtured as a moral and cultural value, rather than merely a technical competency. When students observe a polar bear endeavouring to locate ice or witness deforestation, the visuals circumvent abstract dialogue and engage immediately with their ethical sensibilities. Consequently, environmental education transforms into a process of

ethical, emotional, and social development, rather than being solely a component of the curriculum.

In summary, teachers' strategic use of emotionally impactful visual materials promotes deep engagement and cross-contextual reflection, enabling students to construct meaning through multi-sensory and affective pathways. This aligns with all three theoretical perspectives—constructivist learning, holistic education, and the normative vision of ecological civilisation.

The four topics discussed in this chapter demonstrate the evolution of environmental education in Guizhou primary schools, into an osmosis approach. Environmental education is integrated into daily teaching practices, ethical teachings, cultural values, and practical activities, rather than functioning as an independent subject. Subject-based integration enables students to engage with environmental concepts via familiar academic disciplines; experiential activities facilitate embodied and affective learning pathways; traditional cultural idioms anchor environmental consciousness within local ethical narratives; and moral education contextualises environmentally responsible behaviour as an aspect of broader civic and personal virtue.

This integrated method signifies a wider transition towards contextually aware, culturally rooted, and emotionally impactful environmental education. It aligns with

constructivist learning theories, which assert that meaning is actively constructed through contextual interaction; with ecological systems theory, which acknowledges the significance of interconnected microsystems (home, school, community); and with holistic education, which aims to cultivate the entire child—cognitively, emotionally, and ethically. Thus, environmental education transforms from a static curriculum into a dynamic, relational, and ethically significant activity that corresponds with China's progressive vision of ecological civilisation.

Culture, defined as a collectively held framework of beliefs, values, conventions, and attitudes, shapes individuals' interactions with technology and impacts both industrial production and domestic consumption (Vlek & Steg, 2007). Culture influences the social and economic structures that govern the supply and demand for tangible commodities and services. In numerous cultures, material riches and consumption represent individuals' identity, success, and social entitlements (Dittmar, 1992). A lasting cultural trait of human society is environmental myopia, both physically and socially. To ensure the Earth's ecosystems remain habitable for current and future generations, long-term thinking and enhanced collectivism must be ingrained in society (Triandis, 1995). Vlek and Steg (2007) assert that heightened environmental consciousness and responsibility, along with a recognition of humanity's connection to nature, may facilitate the implementation of several

environmentally advantageous modifications in human behaviours, organisational frameworks, and physical infrastructures.

Within the realm of primary teachers in Guizhou province, China, environmental education has progressively utilised traditional cultural values to enhance students' ecological awareness. Teachers intentionally incorporate Confucian ethical principles, idioms, and classical allusions—such as “己所不欲，勿施于人” (“Do not impose on others what you do not desire yourself”) or “十年树木，百年树人” (“It takes ten years to grow a tree, but a hundred to cultivate a person”)—to facilitate students' understanding of human–nature relationships. Instead of perceiving environmental knowledge as solely abstract or scientific, these teachers contextualise and individualise the notions by anchoring them in ethical reasoning and cultural relevance. This cultural-ethical integration enhances students' emotional engagement and provides greater validity and sustainability to environmental teachings within their social context. By doing so, teachers not only mitigate the environmental myopia identified by Vlek and Steg but also reassert the significance of ecological harmony inherent in East Asia's cultural history.

The word ‘osmosis’ originated from two Chinese idioms, ‘耳濡目染 (er ru mu ran)’ and ‘潜移默化(qian yi mo hua)’. ‘耳濡目染’ comes from a prose by Han Yu (768-824, a poet, philosopher, Confucian scholar) in the Tang Dynasty, meaning that

what the ear often hears and what the eye often sees, one will be influenced without realising it. ‘潜移默化(qian yi mo hua)’ comes from a family motto written by Yan Zhitui (531-591) in the Northern Qi Dynasty, meaning that a person’s thoughts and character are unconsciously affected, influenced, and eventually changed. Aside from lexical sources, this study discovered that ‘osmosis’ can include many idioms and allusions. Each teacher interprets it differently based on the subject they teach and their personal experience and understanding. The study identified four allusions in the conversation with teachers interviewed, one by one, as they progressively approached the core concepts of Confucianism.

While the notion of ‘osmosis’ is deeply rooted in Chinese idiomatic and philosophical traditions, similar ideas exist in Western pedagogical discourse, albeit expressed differently. Concepts such as the ‘hidden curriculum’ (Jackson, 1968) and ‘enculturation’ in anthropological theory similarly suggest that values, norms, and behaviours are often learned tacitly through prolonged exposure to institutional routines and interpersonal interactions. However, the Chinese interpretation of osmosis places a stronger emphasis on the moral and emotional dimensions of learning, highlighting not just what is learned, but how it subtly transforms character and intention over time. This cultural distinction points to the importance of philosophical foundations in shaping how environmental education is internalised and sustained.

Emotional engagement plays a crucial role in transforming knowledge into action, particularly in the realm of environmental education. As Hargreaves (1998) argues, emotional investment is not peripheral to learning but is central to how meaning is constructed and retained. In the Guizhou context, teachers' use of culturally resonant ethical narratives fosters affective bonds between students and environmental concerns, allowing learning to move beyond cognition toward identification and empathy. This emotional resonance not only makes abstract ecological principles more tangible but also nurtures a sense of moral obligation and personal relevance, which are critical for long-term behavioural change.

In Chinese contexts such as Guizhou, the collectivist orientation of society reinforces the communal dimensions of environmental education. Students are not only encouraged to take personal responsibility but are also taught to perceive environmental protection as a shared moral duty, embedded in familial expectations and community roles. This aligns with Triandis' (2018) assertion that collectivist cultures may more readily support pro-environmental norms when these are framed in terms of group harmony, filial duty, and social respectability. As such, cultural values do not merely serve as background variables but operate as active mediators in shaping ecological consciousness and action.

Primary school teachers in Guizhou adeptly integrate Confucian idioms and ethical concepts into environmental teaching to augment children's emotional engagement and cultural significance. Teacher Li Jing noted, *"Cultivating trees takes a decade, while fostering individuals needs a century. I believe that integrating environmental education into our regular teaching will have a more significant influence on future generations.....Children require guidance in appreciating beauty of nature, enabling them to immerse themselves in the nature environment, experience its beauty, evoke emotions, and then develop an affection for this beauty."*Through classic poetry and moral aphorisms, teachers create affective entry points for environmental understanding.

This re-contextualisation of moral idioms deepens students' environmental empathy. Teacher Wang remarked,

"I believe that it is important for children to develop environmental consciousness from a young age. One way to achieve this is through activities like tree planting. Initially, children are introduced to this concept through textbooks. I will consistently encourage discussions about tree planting in class. Then, the children were given the chance to engage in the activity of planting trees. At first, children lacking a complete comprehension of the importance of planting trees, they later realised that domestic plant could generate oxygen, while the use of disposable chopsticks in everyday life results in wasting of resource. However, this is an exceedingly time-consuming process."

You know, as the old saying goes 十年树木，百年树人 (it takes ten years to nurture a tree, but a hundred years to educate a man). A good education program takes a long time to develop.”

The participating teachers from Chinese literature (Lijing, Wang, Deng and Zhangxi) mentioned a concept ‘十年树木，百年树人’. The concept originated from a prose written by Guan Zhong (760-645BC). The meaning is that it takes ten years to nurture a tree, but a hundred years to educate a man. A good education program takes a long time to develop. Through this analogy between “trees”and “people,”teachers emphasise the interconnectedness between humans and nature, using traditional wisdom to support the concept of sustainable development. Some teachers even extend the Confucian maxim “Do not do unto others what you do not want done to yourself”(己所不欲，勿施于人) to a broader interpretation: “Do not do unto nature what you do not want done to yourself.”It is found in the Analects of Confucius. This collection of quotations was compiled by the disciples and re-disciples of Confucius, a prominent thinker and educator during the Spring and Autumn Period (770-476 BC), who documented the words and actions of Confucius and his followers. This aphorism emphasises empathy and the importance of considering diverse perspectives. It suggests treating others with the same respect that one treats oneself and being compassionate and forgiving. Confucianism is not just a fundamental belief system but has been the enduring lifestyle of the Chinese populace for millennia (Kong, 2018).

Teachers frequently employ this phrase to guide students' conduct and cultivate empathy. Teachers substitute the word "others" with "environment" in this slogan when discussing EE.

This reinterpretation aligns with the Confucian worldview of “天人合一”(tian ren he yi), or the unity of Heaven and humanity, which posits that human beings are not separate from nature but part of an interconnected cosmic order. This holistic vision discourages domination over the environment and encourages moral restraint, humility, and harmony. Teachers in Guizhou implicitly draw upon this cosmology when teaching environmental ethics, blending cultural tradition with contemporary ecological discourse. In doing so, they help students see environmental responsibility not as an external imposition but as a continuation of cultural identity and moral self-cultivation.

This practice resonates with the emerging field of Ecological Confucianism, promoted by scholars like Tu Weiming, who argue that Confucian principles such as empathy, self-cultivation, and reverence for life can serve as foundational ethics in the age of ecological crisis. By embedding these narratives into classroom practice, teachers create a culturally grounded framework for sustainability that enhances students' emotional engagement and moral reasoning.

Several teachers remarked that students appear more responsive when environmental issues are framed through culturally resonant idioms. Sayings like “十年树木，百年树人” provide moral clarity and symbolic weight, allowing students to link environmental responsibility to broader life philosophies, such as patience, responsibility, and long-term vision. These culturally embedded tools thus act as both pedagogical devices and affective bridges between abstract concepts and lived experience.

This re-contextualisation of moral idioms deepens students’ environmental empathy. Tian Yuan stated:

“EE fosters a student’s sense of public morality. To apply Confucius’ principle of reciprocity in many life situations. As students grow up, they will develop the ability to challenge negative behaviour and appreciate and support positive behaviour. As well as show respect toward all living beings, including plants and animals, as they wish to be treated. To empathise with other beings inhabiting the planet.”

Similarly, Wang designed role-play scenarios where students impersonated rivers being polluted, enabling them to express how “hurt” the river might feel. This pedagogy, rooted in the Confucian value of empathy and reciprocity, reshapes moral education into a tool for ecological consciousness.

*“I recounted a scenario to my students in which a significant amount of waste was disposed of in the ocean, leading to the death of sea creatures who consumed the waste. In the end, the waste was discovered inside the sea creatures’ bodies. After learning this, students exclaimed and stated that they will not litter everywhere. They are exchanging positions with the sea creatures.”*She added: *“I conducted an exercise in which I selected a few children to act as the river and the remaining children to play the humans that contaminate the river. The children playing humans were instructed to imitate human actions towards the river. They throw little paper balls to those river children. At the end of the play, the children who were playing rivers shared their feelings about human action.”*

Moreover, concepts such as “restraining oneself and returning to propriety is the way to benevolence”(克己复礼) have also been introduced into the classroom by teachers to encourage students to consciously moderate their desires and respect the natural order, thereby striving for a harmonious coexistence between humans and nature. In Confucian philosophy, *keji fuli* goes beyond individual self-control—it positions personal conduct within a broader ethical framework of social and cosmic order. Within the context of environmental education, this concept is reinterpreted to suggest that unchecked human desires can disrupt ecological balance, and only through discipline and self-restraint can reverence for nature be cultivated.

Teachers emphasise that meaningful environmental behaviour change does not stem from external punishment or moralising but from an internalised understanding of why the environment is worth protecting. This insight resonates with constructivist learning theories, which assert that students are more likely to sustain behavioural change when they can build meaningful connections between knowledge and lived experience.

Several teachers observed that when students linked environmental behaviours with traditional ideals such as *self-cultivation*, *virtue*, or the Confucian notion of *benevolence*, they demonstrated deeper emotional engagement and more sustained commitment. For instance, when learning about water conservation or waste sorting, students were not merely following instructions—they were actively reflecting on these acts as expressions of moral discipline. This culturally grounded framing not only enhances the persuasive power of environmental education but also creates a powerful bridge between ethical growth and ecological responsibility.

As Teacher Deng noted, *“I believe that students who neglect their drawers and school bags are unlikely to show concern for their surrounding environment. Omitting a thorough explanation of the reasons for tree planting and suitable locations may result in pupils lacking interest in and failing to comprehend the value of tree planting for the ecosystem.”*

This logic reflects the traditional cultural idea of “cultivating oneself, regulating the family, governing the state, and bringing peace to the world”(修身齐家治国平天下), linking the micro-level of daily discipline with the macro-level of ecological ethics. Within this Confucian framework, moral cultivation begins with the individual and progressively radiates outward—to the family, society, and ultimately, the broader world. This cascading structure suggests that responsible citizenship, including environmental responsibility, is not merely a civic duty but an extension of one’s moral character. Teachers in Guizhou often invoke this principle implicitly when encouraging students to view everyday environmental behaviours—such as conserving water or avoiding food waste—not as isolated acts, but as part of a broader commitment to personal virtue and communal wellbeing. By framing small, localised actions as contributing to planetary harmony, educators nurture a relational sense of ecological citizenship rooted in cultural continuity.

This cultural schema mirrors modern notions of environmental stewardship and shared responsibility, where individual actions scale up to collective impact. Thus, the Confucian moral architecture provides both ethical grounding and motivational scaffolding for sustainable behaviours, offering a locally resonant framework through which environmental education can be meaningfully internalised.

Lastly, many teachers draw inspiration from the holistic cosmology of “天人合一” (Unity of Heaven and Man) —a concept central to Chinese philosophy. It underpins earlier aphorisms by embedding environmental values within a worldview that sees humans and nature as one interdependent system. The concept has been essential in Chinese culture since the time of Confucius (BC 551—479), inspiring and shaping various aspects such as art, literature, philosophy, religion, political views, and social connections. Zhao (2018) described this concept as focusing on the relationship between heaven and man without specifying any particular ideological substance, but rather emphasising a dynamic approach to understanding their interconnectedness.

As Teacher Liu said, when he took students to observe a 600-year-old bridge and told the story of the co-evolution of humans and nature: *“I take students on walks to inspect bridges, and right next to the school, there exists an ancient bridge that has lasted the test of time for almost six centuries. It provides students with a valuable opportunity to comprehend the transformations that have occurred in the natural surroundings during the progression of human evolution. I told my students that our province is located to 7 out of the top 10 highest span bridges in the world. I encourage them to go on a vacation so as to view those magnificent bridges. Bridges serve as conduits that facilitate interpersonal connections and enhance people’s capacity to navigate and explore the broader global landscape.”*

The bridge serves as a channel linking individuals to one another and to the natural environment. By reinterpreting local cultures and philosophies, teachers have developed an ecologically informed educational framework that is historically grounded and culturally rooted, ensuring that environmental education encompasses not only the dissemination of scientific knowledge but also the cultivation of ethical understanding and cultural identity.

This study found that when teachers implement this concept, they are indicating that EE is a sustained educational endeavour intricately linked to shaping human values and behaviour. The teacher also believes that EE is a crucial component of moral education. The study identified three meanings that teachers laid out with this concept based on the dialogues above. 1). Developing students' environmental awareness is regarded as a way to enhance their moral integrity. This process should begin by fostering their emotional connection with the environment. 2). Teachers believed that fostering students' emotional expression is a lengthy and arduous endeavour. Achieving results requires sustained focus and effective supervision over an extended period. 3). The concept itself implies a comparison between humans and trees. Teachers hold the belief that humans have an inherent connection to nature, which should be consistently emphasised in emotional expression.

Teachers in Guizhou demonstrate how ancient Confucian ideals, including empathy, moral self-discipline, and harmony with nature, may effectively foster environmental consciousness. These cultural connections profoundly connect with students and impart moral significance and enduring relevance to environmental education within China's educational and cultural context.

Building on this moral and affective foundation, experiential and participatory activities extend the osmotic approach beyond verbal instruction. They allow environmental education to be practised through repeated routines, family-linked tasks, school activities, and community-oriented forms of participation. Consequently, EE becomes visible not only as a set of values to be taught, but also as a pattern of conduct to be rehearsed and gradually internalised. This gives Guizhou's approach an important practical dimension: students are encouraged to learn environmental responsibility through action, imitation, and everyday participation, rather than through abstract knowledge alone.

At the same time, the participatory character of these activities should not be overstated. Participation is often organised around moral and behavioural expectations, with students encouraged to save resources, protect nature, keep spaces clean, and influence family members through appropriate conduct. These practices carry ecopedagogical potential because they connect environmental learning with action,

emotion, and social relationship. However, this potential remains largely framed by moral formation and collective discipline, rather than by open-ended debate, critical questioning, or sustained examination of environmental conflict and inequality.

4.1.3 Real-world Challenges in Implementing Environmental Education

Regardless of the heightened awareness of environmental concerns and their acknowledged significance in moral and civic education, the incorporation of environmental education in Chinese primary schools, especially in underdeveloped areas like Guizhou, continues to encounter systemic and practical obstacles. Although numerous teachers demonstrate significant personal dedication and ingenuity, their initiatives frequently occur without the backing of institutional structures and policy-level assistance. Based on interviews with teachers across multiple subject areas, this study identifies five interrelated difficulties that constrain the implementation of meaningful, sustained environmental education at the primary level.

Teachers frequently cite a deficiency in curriculum resources and structured pedagogical direction, resulting in uncertainty regarding content delivery, interdisciplinary integration, and student assessment methods. Secondly, the demands inherent in exam-centric schooling result in the marginalisation of non-assessed subjects, so constraining the time and focus allocated to environmental issues. Third, notwithstanding the focus on "whole-child" development, coordination between home

and school is inconsistent, since many parents prioritise academic success above environmental or moral growth. Fourth, the absence of a systematic evaluation or incentive system to recognise teachers' contributions to environmental education results in frustration and diminished motivation. Many educators, particularly those lacking a scientific background, report inadequate topic knowledge, which impedes their capacity to create lessons that transcend moral appeals and foster a deeper ecological comprehension.

The subsequent sections analyse each of these issues in depth, utilising teacher narratives to investigate how these structural constraints influence the reality of environmental education practices in Chinese primary schools.

4.1.3.1 Inadequate Curriculum Resources and Lack of Systematic Guidance

One of the most frequently reported challenges among Guizhou primary school teachers is the shortage of environmental education materials and the absence of a clear, systematic pedagogical framework. Teachers consistently mentioned that they lacked dedicated textbooks, structured lesson plans, or institutional guidance to effectively integrate environmental education into their teaching routines.

As Zhang, a physical education teacher, states: *“There is no standard material for environmental education... I rely on my own experiences and occasional training*

sessions.” Similarly, teacher Dai remarked: *“I think we lack systematic guidance and planning. Everything depends on the individual teacher’s interest or ability.”* Teacher Chen echoed this, stating: *“There are no clear guiding documents. Sometimes we want to do something related to environmental protection, but we don’t know which subject it should go into, or to what extent we should teach it.”*

From a constructivist learning theory perspective, students require organised and incremental knowledge-building experiences to comprehensively grasp environmental challenges. The existing disjointed and inconsistent teaching design hinders the cultivation of a comprehensive understanding.

Li Jing observed: *“We taught waste sorting once, and students remembered a few facts, but they forgot them soon after. Because there was no follow-up or reinforcement, and no contextual application.”*

This reflects how a lack of stable curriculum and progression directly impacts the constructivist emphasis on *“continuity in meaning-making”* and the integration of *“prior knowledge with new experiences.”*

This lack of institutional support also undermines the implementation of Holistic Education, which emphasises interdisciplinary, integrated, and context-rich learning.

Currently, environmental education often exists in a *marginalised* position, struggling to find a stable foothold within the formal curriculum structure.

Wu noted: *“I want to include environmental themes in art class, but I’m afraid the academic director will say I’m neglecting technique training and affecting assessments.”* Her concern reveals how vague policies and a lack of supportive resources produce internal pressure and hesitation in curriculum design.

Moreover, while some schools do have access to limited resources, there is little mechanism for sharing best practices across schools or districts. Wang Yong stated, *“Our school is in a rural town, so we don’t have as many resources as those in the city. I’ve seen urban schools do it really well, but we don’t have the conditions or anyone to guide us.”*

In sum, the lack of curricular resources and systematic guidance has become a major obstacle to the effective implementation of environmental education. Behind this issue lies the absence of institutional support structures, as highlighted in Ecological Systems Theory, and a shortage of pedagogical tools needed to sustain constructivist learning environments. Teachers urgently need stable, rich, and context-appropriate curricular resources to facilitate consistent and meaningful environmental education in primary schools. The lack of systematic curriculum resources therefore does more than

make teachers' work more difficult. It also affects the depth and continuity of environmental learning available to pupils. When teachers rely mainly on scattered materials, personal experience, or occasional activities, EE may remain fragmented and uneven, rather than developing into a sustained inquiry into ecological relationships, environmental problems, and possible responses. This limits the extent to which environmental education can support deeper forms of critical and participatory learning.

4.1.3.2 Exam-oriented Pressures Restricting Pedagogical Space

A predominant hurdle identified in this study is the intense pressure of exam-centric education, which significantly constrains opportunities for environmental education. Several teachers reported that despite their willingness to explore environmental topics, time and curricular pressure make it nearly impossible.

As Wu remarked, *"We want to let students create posters or reflect on what they've learned about the environment, but when exam periods approach, we must focus on skills like drawing techniques because these are what matter in assessments."* Similarly, Zhang expressed, *"We sometimes include environmental messages in PE games, but we must also complete standardised drills and physical test preparation. That's the priority."*

Teacher Wang noted frankly: *“Sometimes, we really want to do more, but we’re constrained. For example, in Chinese lessons, I may want to teach a text related to environmental protection, but if it’s not part of the exam syllabus or official textbook, parents may question whether I’m wasting time, and school leaders may remind me not to affect the exam-focused pacing.”* Her comments reflect how the rigid, assessment-driven structure within the educational system compresses teachers’ autonomy.

Similarly, Teacher Li shared: *“Our school’s primary goal is to improve academic performance in the upper grades, so there’s little room for environmental topics in lesson planning. If I add such content on my own, colleagues may think I’m too idealistic, and parents might see it as irrelevant.”* This demonstrates how, under a score-based evaluation system, environmental education is often viewed as “soft content,” lacking institutional support and cultural legitimacy within the current school framework.

This tension exemplifies an essential clash between constructivist learning concepts, which prioritise exploration, critical thinking, and real-world interaction, and the inflexible structure of standardised testing, which promotes recall and speed. Environmental education, emphasising long-term contemplation and ethical development, is especially susceptible to being marginalised in such frameworks.

This illustrates limitations at the macrosystem and exosystem levels, consistent with Ecological Systems Theory. The national examination system (macrosystem) and the school's internal policy environment (exosystem) influence the curriculum and its values. Although each teacher (microsystem) aspires to innovate, they are constrained by overarching systemic frameworks that prioritise test results over comprehensive learning.

Teacher Li Fei stated: *"If the headmaster observes that a lesson is not helping students' grades, they might question whether it's a waste of time."* This comment highlights how institutional surveillance mechanisms reinforce exam-centred behaviours and suppress initiatives that do not produce quantifiable academic results.

This emphasis on performance over process opposes the principles of Holistic Learning, which advocates for the comprehensive development of the child, encompassing emotional, ethical, and social growth. Deng noted, *"Environmental education needs time for children to think, explore, and feel. But the current rhythm of school life leaves little room for those slow, reflective processes."*

Despite these constraints, several teachers endeavoured to incorporate environmental themes in subtle ways, such as through writing assignments or suggested extracurricular activities. However, they also acknowledged that such initiatives were

often ad hoc and lacked systemic support or collective institutional agreement. As a result, environmental education tended to be implemented in a fragmented manner, appearing in marginal areas of the curriculum or in extracurricular activities without sufficient organisation, depth, or continuity. This suggests that EE occupied a structurally disadvantaged position within the existing educational framework. The issue lies not in the motivation of individual teachers, but in institutional limitations that require more systematic support and clearer governmental guidance.

At the same time, teachers' accounts also showed that students could demonstrate genuine emotional engagement with environmental issues when meaningful teaching scenarios were created. Some students were able to express concern for nature and demonstrate environmental awareness through their actions, suggesting that their understanding was not merely superficial or slogan-driven. However, such engagement requires more sustained opportunities for development. Exam-oriented pressure narrows environmental education not only by reducing available teaching time, but also by shaping what forms of learning are considered valuable. In this context, knowledge that can be tested is more easily prioritised, while open-ended discussion, local ecological inquiry, student participation, and action-based learning are more difficult to sustain. This creates a structural tension for EE in Guizhou: although ecological civilisation discourse gives environmental education moral and political importance,

the examination-oriented culture of schooling often restricts the pedagogical space needed for more critical and dialogic ecological learning.

4.1.3.3 Difficulty in Implementing Home-School Collaboration

Interview data reveal that many teachers view home-school collaboration as a vital component of environmental education. However, in practice, this cooperation often encounters substantial implementation barriers. For instance, Teacher Li Fei commented, *“If parents do not cooperate, students may only stay on the surface.”* He emphasised that whether children can extend what they learn in school to their family life largely depends on whether parents take environmental values seriously. The failure of this “family extension” limits the transformation and deepening of environmental education into students’ everyday lives.

Teacher Lu elaborated on the “Hand-in-Hand: Little Hands Holding Big Hands” initiative. Although the school mobilised parents to participate in tree planting and environmental video production activities, many parents were either perfunctory, hesitant, or outright dismissive. She frankly stated, *“Parents care most about academic performance. Environmental protection is just a bonus.”* Some parents even worried these activities would distract their children from their studies, and thus opposed their participation in non-academic events.

Similarly, Teacher Wu's observation: "*Sometimes students are very enthusiastic, but when they get home, parents say, 'Stop that, do your homework first.'*" This discouragement suppresses students' motivation. She believes that educational philosophies between school and home have yet to be aligned.

From the perspective of Ecological Systems Theory, the family represents a crucial microsystem that should ideally interact with the school (another microsystem) through the mesosystem. Teacher feedback indicates that this contact frequently lacks mutual comprehension and uniform standards, leading to a disconnection in the educational continuum. Holistic education concepts assert that environmental education transcends the transmission of knowledge; it involves fostering values and behavioural habits. If the family fails to offer behavioural direction or act as a role model, students may find it challenging to integrate ecological awareness into their daily practices. A deeper concern repeatedly raised by teachers is their inability to influence family environments. As *Li Hong* highlights, "*I talk about environmental education during parent meetings, but many parents don't respond, and some don't even attend.*" Teachers often described parents as having "uneven literacy levels," which leads to inconsistent support. This indicates that the current model of home-school collaboration relies heavily on individual teacher initiative and interpersonal communication skills, with little systemic support.

In summary, although home-school collaboration is acknowledged as vital for environmental education, its practical execution encounters structural obstacles such as unequal awareness, divergent objectives, and insufficient institutional procedures. This difficulty also reveals a limitation within the home–school dimension of the osmotic approach. The model assumes that environmental values can be reinforced across school, family, and everyday life, but such reinforcement depends on the willingness, time, and ecological awareness of families. Where parents are unable or unwilling to participate, environmental education may remain largely school-based, weakening its intended continuity across students’ daily environments. Strengthening this dimension requires more than encouraging individual families to cooperate; it requires policy and governance support that can sustain shared responsibility, reflection, and practice beyond the classroom.

4.1.3.4 Lack of Assessment and Incentive Mechanisms

Although many teachers include environmental education in their curricula, they commonly cite a lack of adequate assessment frameworks and sustainable incentive mechanisms. Thus, environmental education is sometimes perceived as a “task to be accomplished” rather than a process aimed at achieving meaningful results.

Teacher Deng stated, *“If the school doesn’t require results, then no one cares. You do an environmental activity, write a summary, and that’s it.”* She pointed out that most

environmental education efforts are treated as periodic tasks, where the evaluation focuses on tangible outputs like submitted reports, photo documentation, or bulletin boards. However, these surface-level indicators fail to assess whether students have experienced genuine cognitive or behavioural transformations. This activity-centred assessment logic neglects the long-term value formation that environmental education seeks to foster.

Teacher Chen also questioned: *“Who decides whether you’ve taught environmental education well? It’s not like Chinese or Math where there are standard exams.”* His concern lies in the lack of clear indicators or measurable outcomes for environmental education. Because of this, it rarely enters formal evaluation systems in schools and has little influence on teacher assessments or career progression.

In line with Ecological Systems Theory, assessment frameworks are part of the overarching "macrosystem" of institutional effects. The present lack of these mechanisms indicates that institutions and teachers are devoid of structural support and motivation. In the absence of institutional support, environmental education relies entirely on individual teacher effort, which can be easily compromised by increased workloads or a lack of enthusiasm from parents and administrators.

Constructivist learning theory posits that learning is an ongoing process of meaning construction. In the absence of a rigorous and systematic assessment approach, teachers are unable to determine if students have authentically cultivated environmental responsibility and a readiness to take action. Likewise, the tenets of Holistic Education, which emphasise the development of the entire individual, necessitate sustained, multi-faceted, and cross-contextual feedback, rather than singular assessments based on activities or presentations.

Several teachers also pointed out the lack of award systems or formal recognition associated with environmental education. For example, Teacher Feng stated: *“We have awards for excellent students or class leaders, but there’s no such thing as ‘Environmental Guardian’.”* She suggested that implementing formal acknowledgement systems for environmental engagement would enhance student participation, fostering increased motivation and a heightened sense of accomplishment.

In the evident absence of both evaluation and reward mechanisms, environmental education is diminished to a status of low priority and minimal engagement. Teachers function without standards or evaluations, while learners are devoid of concrete incentives or objectives. This systemic deficiency significantly constrains the profundity and longevity of environmental education.

4.1.3.5 Limitations in Teachers' Professional Knowledge and Their Ecological Literacy

Although many teachers demonstrate strong enthusiasm for environmental education in practice, they frequently acknowledge a lack of systematic ecological knowledge and confidence in delivering related content. Especially for teachers without a science background, addressing concepts such as ecological cycles, climate change, or energy transitions can be daunting. As one Chinese language teacher, Wang, noted in the interview, *"We Chinese teachers talk about environmental protection, but we can only bring in a little bit through the texts."* This statement reflects a broader issue: while teachers are willing to undertake environmental education, their disciplinary limitations restrict their capacity to offer scientifically grounded instruction or to guide students in deeper inquiry.

However, despite lacking formal "professional" ecological knowledge, many of these teachers demonstrate a strong awareness of ecological civilisation principles. They are familiar with state-promoted norms such as energy conservation, waste sorting, green consumption, and limiting plastic use. More importantly, they incorporate these behavioural guidelines into their everyday teaching. For instance, teacher *Zhang* shared, *"We remind students during breaks to drink more water but avoid bottled drinks, throw trash in the right bins, and keep the classroom ventilated. These things have become a natural part of our daily work."* From the standpoint of ecological civilisation theory,

these teachers represent a transition from anthropocentrism to a value system that prioritises harmonious cohabitation between humanity and nature. Ecological civilisation does not require that every person be a scientific specialist; instead, it fosters a communal ecological consciousness through culture, lifestyle, and institutional backing. From this perspective, teachers—despite their absence of specialised knowledge—are essential in promoting civic ecological responsibility and developing behavioural norms consistent with sustainability.

Constructivist learning theory posits that teachers serve as co-constructors within the learning community. Students' learning processes and value development are directly influenced by their knowledge frameworks and environmental awareness. Ecological systems theory similarly categorises teachers' training and institutional surroundings into the "exosystem." In the Chinese contexts listed above, this exosystem is underdeveloped, providing restricted professional development opportunities for instructors to enhance their environmental teaching competencies. Within the framework of comprehensive education, environmental education encompasses not only the dissemination of scientific knowledge but also the cultivation of emotional involvement and the changing of behaviour. Teachers may lack the expertise to elucidate intricate ecological processes; nonetheless, by exemplifying sustainable practices and promoting critical thought, they can effectively cultivate students' moral awareness and ethical dedication to environmental stewardship.

In summary, the obstacles encountered by teachers originate more from inadequate structural support and a discord between their disciplinary training and the demands of environmental education than from a deficiency in capability. Nevertheless, these teachers are already essential proponents of ecological civilisation. Their work warrants enhanced focus and support via training, resources, and institutional acknowledgement.

4.2 Negotiating Curriculum and Values: Scottish Approaches to Primary Environmental Education

In contrast to the more values-oriented and moral-infused approach adopted in Guizhou, China, Scottish primary environmental education—particularly under the framework of Learning for Sustainability (LfS)—demonstrates a distinctive embedded and teacher-led model. Rather than treating environmental education as a separate subject, Scottish teachers tend to integrate it into diverse curricular domains, weaving sustainability themes through science, social studies, health and wellbeing, and outdoor learning. This reflects a commitment to both interdisciplinary education and the development of responsible citizenship.

Drawing on reflexive thematic analysis (RTA) of interviews with eight Scottish primary educators, this section explores how sustainability is conceptualised, delivered, and reflected upon in daily practice. The analysis is structured around six thematic clusters:

- Theme 1: Curriculum Integration and Interdisciplinary Practice — how teachers integrate environmental topics into their teaching through the “Experiences and Outcomes” framework.
- Theme 2: Collaborative Structures for Practice Exchange — the extent and forms of professional cooperation, co-teaching, and knowledge sharing across schools.
- Theme 3: Values, Reflection, and Teacher Identity — how educators’ personal beliefs and ethical commitments shape their pedagogy and practice.
- Theme 4: Place-Based Learning and Community Engagement — the use of local environments and community partnerships to ground sustainability in real-world contexts.
- Theme 5: Perceived Impact and Learner Transformation — observations on students’ attitudinal shifts, behavioural changes, and feedback from families.
- Theme 6: Challenges and Aspirations for the Future — tensions between policy and practice, institutional barriers, and teachers’ hopes for longitudinal impact.

This thematic structure reflects both the diversity of educational strategies and the deep sense of pedagogical ownership displayed by Scottish teachers. Across the data, sustainability emerges not only as a curricular focus but as a guiding principle for classroom decision-making, moral formation, and civic engagement. These findings highlight a distinctly localised yet globally conscious model of environmental education, grounded in teacher autonomy, interdisciplinary flexibility, and a commitment to real-world transformation.

4.2.1 Institutional and Professional Support for Teachers in Learning for Sustainability

A fundamental prerequisite for the execution of Learning for Sustainability (LfS) in Scottish primary schools is the professional and institutional support afforded to teachers. In contrast to certain circumstances where environmental education is an individual endeavour, Scottish teachers function within a framework that deliberately integrates sustainability into the national curriculum. This support is evident in various forms: organised training opportunities, engagement of school-level leadership, and collaborative teaching environments. These interrelated procedures not only strengthen teachers' confidence and proficiency in imparting sustainability education but also guarantee that such initiatives are integral rather than marginal.

In contrast to the primary teachers in Guizhou, who often incorporate environmental content into other subjects without formal training in environmental education, the eight Scottish teachers interviewed in this study all had explicit responsibilities for delivering Learning for Sustainability (LfS). Their professional development pathways reflect a systematic and well-supported structure that emphasises both policy-level alignment and individual growth.

Susan completed an undergraduate degree in primary education with an outdoor learning module and later joined the Learning for Sustainability Scotland network, which regularly connects educators to policy documents, case studies, and updated training.

James, who has a background in biochemistry, has taught all subjects in primary school as a teacher for 15 years. For the last 11 years, he has taught science and technology to every age group across the school. At the time of the interview, he was in charge of a team of teachers at the school as principal teacher. He has always had a keen interest in teaching maths and science. With his science background, he is interested in teaching sustainability and climate change-related programmes.

Alba has worked in the same primary school for 23 years and has held different roles in the school. At first, as a class teacher, she then gained a degree in Physical Education (PE), and she started to step outside the classroom. At the time of the interview, Alba was responsible for health and wellbeing and PE. She considers herself to be a very active person and enjoys teaching outdoors. She noticed that Forest Schools were starting to emerge, so she became a member of the Forest School movement for training. Forest School is a long-term development program that needs to be conducted on a regular basis. It is a participant (children) led educational process that aims to promote, observe and explicitly support children's social, emotional and physical development in an outdoor environment. A training programme that the Forestry Commission Scotland supported between 2003 and 2005 established a core group of trained forest school leaders in the Scottish region. In 2010—2011, the Forestry Commission Scotland and the Scottish Government Learning Directorate funded Forest School training programmes for schools in the Scottish region and now have over 500 trained teachers and assistants (Outdoor and Woodland Learning Scotland, 2022).

Alice is a young teacher who worked for an environmental charity in 2013. Her first encounter with Environmental Education was in her role to provide outdoor education on behalf of schools in the area where she worked. For the past three years, she has been teaching in primary schools and has applied the teaching experience she gained with the charity in the classroom. She said: "So the first two years I was teaching,

so 2019, 2020, 2021, doing a mix of outdoor education with my own class. So, taking them outside to the nature reserves to look at the different wildlife and trying to incorporate that into the curriculum. And then one year I was teaching P 1, 2, 3 classes weekly outdoor education sessions looking at kind of conservation, food chains, kind of trying to tie it into the science and health and wellbeing elements of the curriculum.”

Emily is a teacher who has just completed her probationary year in primary school teaching. She was introduced to environmental education during her Master’s programme. She noticed that there was an outdoor education programme in Edinburgh, which she attended as a student. She also participated in an optional sustainability programme run by Connecting Classrooms. After receiving her Learning for Sustainability recognition with the GTCS (General Teaching Council for Scotland), she went on to attend more relevant courses.

Rusty was a major in biomolecular science before becoming a teacher and was introduced to environmental education in 2007 when he did an internship at a school. He was delighted to be able to teach children what he had learnt at university in an interdisciplinary way.

Linda has been teaching at the same school for over 20 years, where she has become the head teacher responsible for creating and developing sustainability and

conservation work in their local area. As she continued to learn about the environment, Linda became a facilitator and leader of many projects, and she considered it her responsibility to complete the various trainings (e.g., UN climate change Course, Teacher course) associated with her teaching projects.

Jane always wanted to be a primary school teacher. With her passion for the environment, she learnt about the environment and sustainability through her university's school programme, which provided her with a solid foundation for her future teaching. She graduated in 2016 and went on probation, where Jane started to put her learning into practice. In 2017, she started her master's degree, where she learnt more about sustainability in-depth. Meanwhile, she brought sustainability into her teaching. She is currently the leader of the school's Sustainability Learning Programme. She also confesses that her passion for the environment comes from her father, who was very environmentally conscious. She said: *"He was very into the cycling, he was very into making sure we, you know, we weren't going on journeys that... making sure that we weren't polluting the environment and things like that, with how we travelled. So, I think that kind of definitely left an impact on me."*

From the perspective of ecological systems theory, the progression of LfS teachers in Scotland does not adhere to a linear path of receiving training → implementing policy. Instead, it occurs within a dynamic interaction among many systemic levels.

The instructors occupy the nexus of the mesosystem and the exosystem, where school-based LfS coordinators, local authority networks, and inter-school collaborative initiatives constitute the mesosystem, enabling the dissemination of knowledge and pedagogical coherence. Simultaneously, national frameworks such as the Curriculum for Excellence (CfE), the GTCS professional standards, and governmental laws necessitating sustainability education in teacher preparation programs exemplify the exosystem. These systems not only convey top-down resources but also function as interactive educational ecologies, where teachers actively seek opportunities for professional agency and collaborative curriculum building.

Teacher collaboration is crucial for integrating Learning for Sustainability (LfS) into the instructional framework of Scottish schools. Interviewees regularly highlighted both formal and informal networks that enable the exchange of practices, collaborative development of learning materials, and peer reflection. These collaborative frameworks not only reduce individual responsibilities but also cultivate a shared professional identity centred on sustainability education.

4.2.1.1 Interaction Between School Culture and Policy Support

One of the key factors supporting the deep implementation of Learning for Sustainability (LfS) in Scottish primary schools is the synergistic interaction between national policy frameworks and school-level culture. Teachers are not isolated

executors of top-down policy but work within an institutional and cultural ecology where policy provides structure and school ethos reinforces daily practice.

Linda, a head teacher and sustainability leader in her school, highlighted this dynamic. She has completed several environment-related training programmes—including a UN Climate Change course—and sees her role as both a learner and a leader: *“I feel it’s my responsibility to take the lead. Our school values that, and we work together on it.”*

Her experience demonstrates how individual agency is amplified within a supportive institutional culture. In terms of ecological systems theory, this reflects the productive interplay between the microsystem (individual teacher) and the mesosystem (school organisation), particularly when supported by engaged leadership.

Emily also described her school as open and responsive, enabling her to adapt external programmes such as *Connecting Classrooms* to local contexts: *“My school were quite open to the project, and I was able to share ideas with colleagues and adapt them based on what we were seeing.”* This collaborative ethos exemplifies a fundamental principle of constructivist learning theory: that knowledge is co-constructed through social interaction. In this case, sustainability education evolves

from being merely an individual classroom initiative to becoming a collectively shared pedagogical endeavour within the school.

From a perspective of curriculum theory, this method of cultural integration harmonises seamlessly with the principles of Scotland's Curriculum for Excellence (CfE), which advocates for teacher autonomy through "Experiences and Outcomes" instead of rigid textbooks. The curriculum serves as both a manifestation of implementation and an outlet for cultural negotiation. From the perspective of holistic education theory, these integrated support systems assist instructors in attaining instructional goals. They build supportive learning communities characterised by similar ideals, emotional dedication, and a common educational objective.

Moreover, school culture often acts as an interpreter of national policy, translating abstract frameworks into concrete daily practices. The combination of bottom-up cultural integration with top-down policy directives creates a dual mechanism that supports the sustained and evolving implementation of LfS throughout the system.

4.2.2 Curriculum Integration and Interdisciplinary Practice

A fundamental attribute of Scottish environmental education in primary schools is its interdisciplinary integration rather than its treatment as a discrete subject. The

Curriculum for Excellence (CfE) promotes the integration of sustainability concepts into daily classroom practices using adaptable, outcome-oriented frameworks. This allows teachers to integrate environmental information into science, social studies, health and wellness, and outdoor learning—frequently through project-based and collaborative methods. These integrative techniques embody the constructivist learning theory, wherein knowledge is collaboratively developed through significant settings, and they also correspond with holistic education principles that emphasise the interrelatedness of learning domains.

Teachers participating in this study uniformly articulated that environmental themes are integrated not via strict mandates but through interpretive, adaptable pedagogies influenced by their personal values, school environments, and student requirements. This adaptive implementation of national curriculum outcomes illustrates a negotiated curriculum model, in which the teacher functions as both a designer and interpreter of policy within their local context. Utilising their academic expertise, personal experiences, and community partnerships, these teachers reconceptualise sustainability as a dynamic, changing notion that transcends disciplinary lines.

4.2.2.1 Integrating Environmental Topics through “Experiences and Outcomes”

In Scottish environmental education practices, the Curriculum for Excellence (CfE) does not prescribe a standardised environmental education syllabus. It provides a

flexible, outcome-focused approach via its “Experiences and Outcomes” framework. Teachers construct curriculum according to these open learning objectives, facilitating the incorporation of environmental concerns across several disciplines. This methodology—characterised by defined objectives and adaptable pathways—aligns with curriculum theory, which promotes objective-driven, content-flexible frameworks that enhance teacher autonomy. They often create and direct unique environmental education initiatives based on their particular values, lived experiences, and educational philosophies. This “bottom-up” motivation, consistently emphasised in interviews with all eight teachers, demonstrates a profoundly internalised sense of educational duty and a proactive dedication that surpasses curricular limitations.

Utilising science outcomes in the Curriculum for Excellence, James designs classroom activities centred on climate systems, energy consumption, and ecological imbalance—converting environmental subjects into avenues for interdisciplinary and inquiry-based learning. James stated: “We were involved, the school, in a project called Global Foot-printing.... We did it in primary seven, and then we kind of rolled it out across the school. And the idea was getting children to look at their personal global footprints and then looking at the global footprint of what we would now call a carbon footprint.....One of my jobs over the holiday is trying to look around the world for more of these stories, where climate change is having a big impact, that I can somehow link to children in Scotland’s own experiences. Because I genuinely feel that that is the

way in, that's the way to get children passionate about climate change. That's the way to get them passionate about sustainability. That's the way to get them to think about their own lifestyle choices, but also get them passionate about putting pressure on big businesses and putting pressure on governments and putting pressure on the decision makers at the top level."

Rather than implementing a prescribed syllabus, teachers select relevant outcomes and build lesson content around them, adapting to student levels and school settings. This empowers teachers to embed environmental themes across science, health and wellbeing, social subjects, and even physical education. As Alba explained: *"So it would be a collaboration between myself and the other class teachers. For the sustainability, I organize three or four whole school outdoor days every year. Where all the children are out during the day, and everything has a theme. So all the activities that we do are based around a theme. So it could be to do with oceans or to do with life on land. We might have an animal theme where we're looking at how we can help and support our local environment. And we also work closely with the national park, with the staff there. And sort of any other agencies that are around about...as much as we can, we get other people involved so that the children are realising that there are things happening nearby them, that they could be involved with."*

Susan emphasised how such flexibility supports embedding LfS across subjects: *“in class. We have recycling bins. So, the children, for a long time, have been recycling paper and plastic away from the plastics that can’t be recycled or just general waste that can’t be recycled.....We have Eco Focus days. We have the Eco week. We grow. We’re developing the areas in the playgrounds with plants.....For a time, measured the weight of food that was being thrown away. And again, making the children aware of that. And they were always, of course, quite surprised by the amount of food that was being thrown away.”* Her approach encompasses waste management and sustainable consumerism, aiding students in comprehending environmental concerns through the lenses of public policy and individual accountability.

Alice integrated CfE objectives with health and well-being while instructing P1 to P3 children, implementing project-based education centred on nature protection, food chains, and habitat comprehension. She described: *“.....doing a mix of outdoor education with my own class. So taking them outside to the nature reserves to look at the different wildlife and trying to incorporate that into the curriculum. And then one year I was teaching P 1, 2, 3 classes weekly outdoor education sessions looking at kind of conservation, food chains, kind of trying to tie it into the science and health and wellbeing elements of the curriculum.....from like even just literally getting them into a green space, I think that’s really important for their health and wellbeing. In terms of physical fitness and also kind of their mental wellbeing as well. And then for me, that*

ties in with having a kind of sense of responsibility and ownership over their local green spaces so that then there's an incentive for them to want to look after their local green spaces because there's a lot of antisocial behaviour associated with a lot of the green spaces, and I think that environmental education and outdoor education could potentially reduce that antisocial behaviour in the long term."

Aba is a striking example. She described herself as an "active person" who enjoys the outdoors and proactively sought Forest School training when the movement began to emerge: *"I'm quite an active person and enjoy being outside. When Forest Schools started to emerge, I signed up for training and now I run regular outdoor learning sessions."*

Forest School is a nature-oriented curriculum that focuses on child-directed, sustained involvement to enhance emotional, physical, and social growth. Alba's implementation of this paradigm in her classroom demonstrates her professional autonomy and the constructivist learning principle of contextualising knowledge within genuine and experiential settings. Her initiative is not an adjunct to existing curricula, but a comprehensive educational method that amalgamates physical activity, emotional engagement, and social contact.

Similarly, Jane drew her environmental values from her family background, particularly from her father's ecological consciousness, which she transformed into classroom practice:

“My dad was very into making sure we weren't polluting the environment... that definitely left an impact on me.”

She began teaching in 2016, quickly integrating sustainability into her lessons and eventually leading her school's sustainability programme. This translation of family values into teaching embodies the Confucian harmony ethos and holistic education theory, which stresses moral development, embodiment of values, and the cultivation of ethical character in education.

This disciplinary-driven practice demonstrates how teachers draw upon their academic specialisms to create diverse and deep learning experiences, expanding both student perspectives and curricular richness.

From a curriculum theory perspective, CfE's “Experiences and Outcomes” are not content prescriptions but expressions of educational values and aims. Teachers play the role of interpreters and enactors, translating these outcomes into context-specific practices and giving meaning to national policy through localised pedagogies.

This system also illustrates ecological systems theory. CfE outcomes represent part of the exosystem—policy structures that shape but do not directly instruct the teacher. Through this system, teachers are empowered within the mesosystem to draw on professional networks, school-level coordination, and peer collaboration, becoming agents of curriculum development rather than passive transmitters.

A recurring element that emerges from the interviews is the concept of autonomy within the framework of accountability. Teachers appreciate the professional autonomy afforded by the Curriculum for Excellence, while they remain cognisant of their obligations to fulfil national objectives. This tension creates a productive environment where sustainability education is customised, modified, and effectively integrated into the actual experiences of various schools.

Furthermore, this policy framework echoes the logic within Xi Jinping's Ecological Civilisation Thought—in which ecological values are positioned as foundational to long-term social development. Through goal-driven curriculum design, Scottish teachers internalise these values within student learning, moving from policy-level discourse to pedagogical practice. From the standpoint of Xi Jinping's Ecological Civilisation Thought and the Confucian principle of harmony, this approach to curricular flexibility reflects the notion that ecological education should be contextually

anchored and ethically motivated—teachers in Scotland serve as cultural intermediaries who reconcile global challenges with local educational practices.

4.2.2.2 Deep Interdisciplinary Integration and Collaborative Teaching

In Scottish primary education, environmental education is typically not delivered as a stand-alone subject. Instead, it is embedded through cross-disciplinary integration across subject areas such as Science, Health and Wellbeing, and Social Subjects. Guided by the “Experiences and Outcomes” statements within the Curriculum for Excellence (CfE), teachers adopt a flexible approach to curriculum design, centring sustainability-related topics as connecting nodes across disciplines.

Many teachers engage in project-based or thematic teaching units, using issues like “climate change,” “resource use,” or “ecosystem interdependence” as interdisciplinary anchors. This approach breaks down traditional subject boundaries and fosters holistic understanding, encouraging pupils to explore sustainability through scientific, social, and personal perspectives while developing critical thinking and a sense of responsibility.

Susan explicitly described how she intentionally integrates environmental themes across multiple subject areas. Her lesson design includes projects on waste management, carbon footprint, and ecological lifestyles, allowing students not only to acquire

scientific knowledge but also to reflect on social responsibility and ethical choices. This interdisciplinary model reflects CfE's vision of integrated learning and aligns with constructivist learning theory, where learners actively construct meaning across interconnected contexts.

Jane leads her school's sustainability programme and designs cross-subject modules focused on energy use, transport, and environmental justice. She commented:

“You can link these things together, and I think that helps to bring in an ideal approach. So interdisciplinary approach. Which, for research I’ve done myself, is very important because if we are going to teach all of these different issues...and like I said, they’re all very much interconnected, so the children need to be able to take their learning from different subject areas, whether that’s knowledge or skills, and bring those together and to tackle some of the challenges that we face.”

This integration across domains reflects a holistic education approach, where learning is seen as interconnected rather than fragmented. The interdisciplinary emphasis also facilitates deeper cognitive and emotional engagement, allowing students to understand sustainability as both a scientific concern and a social responsibility.

A key characteristic of Learning for Sustainability (LfS) in Scottish primary schools is its emphasis on cross-curricular integration. Rather than treating sustainability as a discrete subject, many teachers actively embed LfS themes into core areas such as Science, Social Subjects, and Health and Wellbeing, designing coherent, project-based learning experiences that reflect real-world complexity. As James stated:

“I’ve taught topics like climate change and renewables... but also linked it to inequality and global responsibility through Social Studies.”

Here, LfS is not confined to environmental science but becomes a moral and civic discourse, aligning with Confucian educational values of cultivating responsible citizens. James’s thematic instruction echoes Xi Jinping’s Ecological Civilization Thought, which advocates a systemic view of humans and nature as a community of life.

Although curriculum policies (exosystem) encourage co-teaching, the actual “time structures” and “organisational processes” have not yet fully supported systematic collaboration among teachers. In other words, within ecological systems theory, this tension arises precisely from the misalignment between the exosystem (national curriculum and policy) and the microsystem (teachers’ everyday working conditions).

However, not all teachers experience the same level of collaborative support when delivering interdisciplinary LfS. While Alba felt well-supported through Forest School networks and local collaborations, Emily, a newer teacher, expressed that she often had to independently design cross-subject content due to a lack of coordination time: *“I sometimes feel like I’m working in isolation when trying to plan sustainability lessons across subjects. It would be great to have more time to plan with others.”* Similarly, Rusty admitted: *“We’re encouraged to do it (LfS), but we don’t really get structured time to work together... so it’s mostly individual effort.”*

This highlights a fundamental systemic constraint in achieving co-teaching objectives: whereas legislation promotes collaboration, institutional limitations such as scheduling and workload might impede its realisation. Consequently, interdisciplinary Learning for Sustainability (LfS) is aspirational in certain contexts and completely actualised in others, contingent upon local leadership, culture, and resources. These statements illustrate a negotiated curriculum, which is collaboratively developed rather than centrally mandated, emphasising teacher agency. However, such agency is constrained by the microsystem conditions of each school (e.g., staffing numbers, leadership vision, inter-teacher dynamics), according to Bronfenbrenner’s ecological systems model.

4.2.3 Project-Based and Student-Led Sustainability Practice

In Scottish primary schools, project-based approaches to Learning for Sustainability (LfS) serve as an effective way to engage students in real-world, contextualised learning. These projects not only allow children to make connections between classroom knowledge and environmental issues but also emphasise student agency, which aligns with constructivist learning theory. Teachers often reported designing or co-developing sustainability projects that extended beyond a single lesson or subject, allowing learners to take ownership and actively participate in shaping their environmental learning journey. Project-based learning transcends a conventional pedagogical tool; it embodies a philosophical framework that empowers students to engage meaningfully with real-world environmental challenges. Teachers facilitate contextually rich initiatives that enable students to experience sustainability as a lived and enacted practice, rather than only a theoretical concept.

James described a powerful project rooted in the lived transformation of the school's surrounding environment. Over the past decade, he had seen the green fields around the school gradually replaced by over 3,000 newly built houses. Concerned about the environmental implications of such rapid urbanisation, he designed a project titled "Urban Expansion and Climate Impact", guiding pupils through an investigation of their changing community:

“We went to a construction site and spoke with the workers about how they try to mitigate climate impact. We asked: What materials are you using, where are they coming from, what happens to the land and biodiversity here?”

Students went beyond the classroom to engage with construction workers, investigating the environmental footprint of materials, land use changes, and biodiversity loss. At the project’s conclusion, the pupils wrote letters to local government officials and developers expressing their views. This action caught the attention of the wider community and media:

“The MSP actually came to the school. The planning department also joined and explained to pupils how development, economy and the environment are interconnected.”

This initiative not only integrated science, geography, writing, and social studies but embodied the core principle of constructivism—deep learning through authentic engagement. Most importantly, it empowered pupils to feel personally responsible and capable of influencing real-world change, even at the primary school level.

Many other teachers also described projects with similar characteristics. For example, Jane led a school-wide waste audit project where pupils created their own classification system and designed interventions, becoming key agents of change. Alice

supported students in developing biodiversity signage for local parks, bringing classroom learning into public community spaces. Rusty ran an energy consumption audit project, integrating mathematics, science, and persuasive writing to help pupils reflect on domestic energy usage and advise local councils.

These projects shared key characteristics:

1. Student agency—teachers acted more as facilitators than instructors.
2. Authentic contexts—learning occurred through real issues and locations.
3. Cross-disciplinary learning—knowledge flowed organically across subject areas.
4. Tangible outcomes—students saw the direct impact of their efforts.

Constructivism asserts that knowledge is not passively acquired, but actively constructed by the learner through interaction with the environment. In James' project, students were not only educated about environmental challenges; they assumed roles as researchers, interviewers, and policy advocates. The exploration of local area transformation, data collection, and engagement with stakeholders such as builders and legislators allowed students to derive meaning through action. Piaget and Vygotsky asserted that profound learning transpires when students face cognitive challenges within their zone of proximal development; this initiative offered such a framework by

necessitating multidisciplinary inquiry, ethical reasoning, and civic engagement. This method signifies a significant shift from rote learning, fostering students' personal understandings of sustainability based on their lived experiences.

James' project exemplifies the linking between the microsystem and the exosystem. Students initiated their engagement from their near environment (school, neighbourhood) and expanded their impact to more remote systems (planning departments, governmental entities, media). The introduction of the MSP and involvement with policy stakeholders signifies a tangible connection between individual learners and systemic influences. Furthermore, teachers such as Jane and Linda intentionally situated students within dynamic ecological networks, connecting home, school, and community through collaborative sustainability projects. Scottish primary environmental education functions not in isolated classrooms, but within interconnected ecosystems, strengthening ecological systems theory's focus on systemic reciprocity.

Under the Curriculum for Excellence (CfE), teachers have the autonomy to develop interdisciplinary and contextually relevant courses. James demonstrates this adaptability by employing "experiences and outcomes" as a framework to integrate climate and urban development topics into science, geography, literacy, and citizenship education. His approach exemplifies curriculum-as-praxis—not a static blueprint, but

a dynamic, experiential process influenced by practical significance and ethical intent. It asserts that curriculum must not only convey material but also facilitate values, interrogate power dynamics, and address community-specific issues.

Projects like those of James and Jane embody a holistic approach. Students were not only gaining knowledge but also engaging emotionally (concern for the environment), ethically (evaluating urban growth), and socially (interacting with adults and authorities). These experiences foster internal ecological consciousness, harmonising thought, emotion, and behaviour. Sustainability education is not simply the transfer of information; it is the cultivation of identity, fostering responsible ecological citizenship in children who recognise their interdependence with the Earth and others.

Though situated in a different national context, these projects mirror key tenets of “ecological civilisation”: fostering respect for nature, harmonising human development with environmental stewardship, and building ecological consciousness from early education. James’ project explicitly adheres to the notion that economic progress must be harmonised with ecological sustainability, a fundamental aspect of Xi’s environmental governance philosophy. This illustrates a transcultural resonance, wherein Scottish educational systems inadvertently echo ideas advocated in China’s sustainability policy rhetoric, providing a basis for comparative analysis. Through a

Confucian perspective, James's counsel illustrates the teacher's job as a moral producer rather than simply an educator. By engaging students in the communal life—prompting them to correspond with public officials, interrogate authority, and contemplate enduring social harmony—he cultivates the ideals of ren (benevolence), yi (righteousness), and li (propriety). The concept transcends personal accomplishment to highlight relational accountability: students are responsible not only for their education but also for their impact on the welfare of their communal surroundings.

4.2.4 Challenges in Implementation

Despite the systemic support and professional autonomy observed in many Scottish primary schools, the implementation of Learning for Sustainability (LfS) is not without its challenges. Teachers reported several recurring barriers, including time constraints, curriculum overload, lack of external support, and variable leadership prioritisation. These issues reveal the tensions between policy ambition and practical realities on the ground.

4.2.4.1 Time Pressure and Curriculum Overload

One of the most frequently mentioned challenges was the difficulty of finding time to implement LfS meaningfully within a demanding curriculum. Teachers, especially those in leadership roles or with full teaching schedules, found it hard to maintain consistent engagement with sustainability projects.

As Rusty commented: *“We’re short of time... and also the kind of changing dynamic of staffing... having a group of teachers who are really passionate about it and then other teachers come in and they’re not as sure, and then it gets lost.”*

Rusty’s comment highlights not only time limitations but also the instability of staffing as a barrier to maintaining continuity in LfS. The rotation of teachers and inconsistent levels of engagement can fragment sustainability practices, especially in smaller schools or where leadership does not explicitly prioritise LfS.

Jane echoed similar frustrations: *“I have been trying to push things through with the Eco Group and run things... but sometimes it just felt like it wasn’t really a priority anymore. There’s always something more urgent.”*

Alba indicated that her outdoor learning program is deficient in staffing hours and requires additional teaching assistants and parent volunteers. She desires the expansion of outdoor activities to encompass the upper primary grades. This reflects how environmental education, although promoted at the national level, can be deprioritised at the school level due to short-term operational pressures. The emotional labour of “pushing through” sustainability work without institutional alignment can lead to burnout or disengagement.

4.2.4.2 Lack of Wider Support and Structural Integration

Several teachers also described challenges in accessing community partners or aligning external organisations with school values. While Scottish schools generally enjoy greater freedom in forming partnerships, there remains the issue of fragmented or inconsistent collaboration, especially in rural areas.

Alba noted: *“We have to do a lot of the planning and resourcing ourselves. Sometimes it feels like we’re reinventing the wheel every year. I wish there was more continuity or shared tools.”*

Due to the rigorous curriculum, environmental education is not given precedence. Integrating environmental education with disciplines such as mathematics and English proved to be problematic. Rusty saw that the educators with whom he collaborated showed a deficiency in confidence regarding the instruction of science and environmental subjects; yet, due to his personal background in STEM disciplines, he felt at ease in this domain. In terms of classroom management, he observes that as grade levels increase, students are more likely to contest the teacher’s authority, prompting him to continually seek improved tactics for managing student behaviour.

James similarly noted a lack of confidence among his colleagues and believed that training workshops and practical teaching manuals were necessary. He concurred with Rusty's perspectives on the Scottish curriculum, advocating for organised teaching frameworks and an international outlook on educational content. He asserts that climate change education must be internationally interconnected. He also indicated a desire for a tracking system to monitor the outcomes of students post-elementary school. He asserts that a method is necessary to evaluate the long-term effects of teaching and learning, which would provide him with feedback regarding the efficacy of his instruction, its shortcomings, and potential areas for enhancement. James desires a reliable, authorised, and centralised repository for teaching and learning materials.

This reveals the structural challenge of decentralised responsibility — while autonomy is empowering, it can also lead to duplicated effort, uneven quality, and inefficiency if not backed by a robust network of shared resources or ongoing support.

4.2.4.3 Misalignment Between LfS Values and Institutional Accountability

Another systemic issue concerns the tension between LfS's holistic aims and traditional measures of academic success. As some teachers pointed out, schools are still primarily evaluated based on test scores and academic performance, rather than values-led or experiential learning outcomes. Emily commented: *"There's not really a way to assess this kind of work. I mean, you can see the kids are engaged and reflective,*

but how do you put that on a report card?”Rusty acknowledged the absence of a standardised approach to teaching scientific and environmental education, noting that it largely relied on the teacher’s discretion. The extensive Scottish curriculum encompasses numerous courses, resulting in a substantial task for him. Jane articulated her apprehension regarding the marginalisation of environmental education within core subjects and emphasised the necessity for a robust strategy to incorporate sustainability throughout the curriculum. Additionally, she enquired about the post-school trajectories of students and expressed concern that they might become disengaged from Education for Sustainable Development (ESD).

This indicates a deeper philosophical problem in sustainability education — the lack of formal metrics to assess transformative, interdisciplinary, or student-led learning. As a result, teachers may feel their LfS efforts are invisible or undervalued within existing evaluation systems.

As Biesta (2009) argues, the most meaningful forms of education—those that nurture subjectivity, critical engagement, and ethical responsibility—are often the least amenable to quantification. LfS aspires to exactly these outcomes, yet current accountability mechanisms prioritise what can be measured over what matters. This creates a misalignment between what teachers are encouraged to do pedagogically and what they are required to demonstrate administratively.

Several teachers expressed a sense of frustration or emotional fatigue, feeling that their work in sustainability, though deeply valued by students, is sidelined by institutional pressures. They described a kind of pedagogical dissonance: being passionate about environmental learning, yet constantly needing to justify its place within high-stakes assessment regimes. This can contribute to what one teacher described as the “invisible labour” of sustainability education—important but structurally marginal.

This tension reflects a broader structural paradox: educational systems increasingly promote sustainability as a goal, yet often fail to revise the very structures—assessment, accountability, curricular design—that would allow such goals to be meaningfully pursued. Without systemic alignment, teachers remain in the difficult position of bridging the gap between visionary policy and rigid institutional practice.

4.2.5 Community and Family Connections

A notable theme across the interviews is the strong feedback loop between students, their families, and the broader community. Every teacher interviewed reported receiving positive responses from pupils, not only in the classroom but also through the

ways students influenced their family environments. These interactions reflect the broader ecological impact of Learning for Sustainability (LfS), reaching beyond the school walls.

Jane shared that her students began to engage more deeply in class and showed growing confidence in expressing ideas. In addition, kids engaged in discussions with their parents regarding the knowledge they acquired at home. She was pleasantly delighted to observe that the youngsters would assimilate the knowledge she imparted to them and thereafter transmit it to their parents in their own homes. She stated that the students experienced a sense of empowerment. She highlighted a powerful moment: *“Whereas now it’s like they feel that they can have a positive impact, and they want to come up with ideas and stuff... feeling empowered as well is always one change. It’s really nice to see in terms of the children.”*

This shift in mindset extended into the home, where students initiated conversations with their parents about environmental issues. Such examples exemplify microsystem-mesosystem interaction in Bronfenbrenner’s ecological model, where the child serves as a bridge between school and family settings.

Linda echoed similar observations, noting that her pupils “ask more questions and share ideas with one another,” demonstrating a newfound sense of agency. Emily,

working in a disadvantaged community, observed emotional development in her pupils, including empathy and mutual respect, especially when students began caring about things “beyond themselves.” These moments highlight the holistic education perspective, where emotional, social, and ethical growth are as valued as academic outcomes.

Alba’s students demonstrate high levels of engagement and enthusiasm during Forest School, with an explicit focus on the activities. She has observed a change in parents’ perspectives, with some parents holding the belief that: “Oh, what’s the point of that?” “Why are they out all day just running about doing things?” “Why aren’t they learning maths and literacy?” “Why aren’t they in class?” However, when the parents witnessed her interaction with the children, they recognised that engaging in outdoor activities involved more than simply engaging in physical play. Subsequently, both parents expressed significant eagerness towards the events and maintained a receptive attitude.

Susan noted that students’ growing environmental awareness wasn’t confined to school activities. She observed children developing a “love and care” for nature across different contexts, showing that LfS not only informs but transforms student identity, aligning with the Confucian notion of *xiushen qijia zhiguo pingtianxia* (修身齐家治国平天下) — that one’s personal cultivation can influence wider societal harmony. In

short, these stories illustrate how environmental education becomes multigenerational and communal, not just institutional. Students become messengers and initiators, extending the scope of LfS beyond schools and into homes and neighbourhoods.

4.2.6 Aspirations and Reflections on Long-Term Impact

While Scottish primary school teachers displayed a high degree of autonomy and creativity in implementing Learning for Sustainability (LfS), their interviews also revealed a profound concern—a persistent desire to understand the long-term impact of their teaching. This aspiration reflects a deep-rooted sense of professional responsibility and highlights a critical gap in environmental education practice: the absence of mechanisms for longitudinal tracking and continuity.

A prevailing theme among participants was a longing to trace the post-primary trajectories of their pupils. Teachers spoke of their joy in seeing students flourish—developing empathy, environmental awareness, and a love of nature—but also shared a sense of incompleteness when students moved on to secondary school.

James articulated this desire explicitly: *“We can track them through secondary, but to track them beyond secondary and see where they end up and how their attitudes change, I suppose, towards climate science... to measure them at primary school and*

then middle of secondary school and then leaving secondary school—how's their attitude changed? How's their knowledge of climate changed? How's their motivation to have a positive impact changed?"

His statements indicate both a personal inquisitiveness and a didactic desire to assess and enhance teaching efficacy. This directly addresses the ideas of holistic education philosophy, where the objective transcends cognitive achievement to include long-term ethical growth and practical interaction with the world.

Another recurring concern was the potential loss of progress when students transition to secondary school. Jane noted: *"A lot of the feedback from secondary teachers... would say that all this great work that we do in primary school is lost when they go to secondary school because... in secondary school, it's more about exam learning."*

This highlights a disconnection between micro- and macro-systems, as conceptualised by ecological systems theory. The commitment of primary teachers exists within a microsystem of learner-centred, experiential sustainability education. However, when the exosystem—represented by exam-driven secondary curricula—fails to uphold the same values, a rupture occurs, threatening the continuity and internalisation of LfS principles.

During the interviews, teachers have shown a strong propensity for introspection and professional development. They were not only content with observing immediate student participation but were profoundly concerned about the long-term implications of their educational initiatives. Their enquiries indicate a persistent interest in determining if their teaching methods effectively cultivate enduring value formation and behavioural change, as well as identifying any aspects of their practice that may have been neglected or need additional enhancement. This form of reflection is not simply a matter of pedagogical strategy—it reveals a deeper ethical commitment to education. These teachers perceive themselves not as passive conveyors of information, but as proactive facilitators of understanding and change. As Linda said, she is dissatisfied with only “fulfilling curriculum requirements,” and persistently enquires: *“Have we genuinely altered the children’s developmental trajectory?” “Might I have accomplished more?”*

From a constructivist learning theory viewpoint, this reflexivity illustrates the teacher’s position as a co-creator of knowledge, not only directing students in meaning-making but also perpetually refining their own educational views via experience. From the lens of holistic education, this illustrates that teaching is not merely a technical task but a journey of shared growth—where the personal development of teachers is inextricably intertwined with that of their students.

This desire for educational improvement indicates a systemic deficiency in the wider educational system. Although Scotland's institutional framework offers strong initial training and collaborative school cultures, there is a significant deficiency in long-term procedures for teachers to monitor, assess, and enhance the effectiveness of their sustainability-oriented pedagogy. This indicates a gap within the ecological systems theory framework, in which the classroom teaching "microsystem" often lacks robust interactive feedback loops with the educational policy, research, or longitudinal student evaluation "exosystem."

This profound contemplation signifies a manifestation of teacher subjectivity and moral enlightenment. Instead of simply executing policies, these teachers are enquiring into the core purpose and significance of education. This educational idealism aligns closely with Confucian views on education as a means to achieve full humanity, alongside the moral obligation inherent in Xi Jinping's notion of Ecological Civilisation, which regards education as pivotal to the evolution of personal awareness and societal values.

4.3 Comparative Analysis of Environmental Education Practices in Guizhou and Scotland

Environmental education, by its nature, is a deeply contextualised practice, shaped not only by curriculum frameworks and institutional norms, but also by broader cultural, political, and philosophical foundations. After analysing the environmental education practices of primary school teachers in Guizhou (China) and Scotland (UK) separately, this chapter now brings the two into direct dialogue. Through a comparative lens, it explores how teachers in both regions understand, implement, and navigate sustainability education within their respective educational ecologies. Such comparison is not only necessary to identify differences in strategies and obstacles, but also crucial for understanding how culturally embedded values influence the aims, content, and pedagogies of environmental education. At the same time, the comparative analysis pays attention to the extent to which environmental education in each context moves beyond policy delivery or curricular incorporation towards more participatory, agentic, and potentially transformative forms of learning. This is particularly important in examining whether teachers are positioned primarily as transmitters of values and curriculum, or as reflective practitioners who create space for dialogue, critical engagement, and ecological responsibility. Read in this way, the comparison helps to illuminate not only how environmental education is organised differently in Guizhou and Scotland, but also how each context enables or constrains deeper forms of educational response to environmental and social questions.

The purpose of this comparison is not to identify which context offers a superior model of environmental education, but to examine what becomes visible when two differently organised educational systems are placed in dialogue. Guizhou and Scotland illuminate different possibilities and limitations of EE: the former shows how environmental responsibility can be culturally embedded through moral education, policy alignment, and everyday school practice, while the latter shows how sustainability can be opened through teacher autonomy, interdisciplinary learning, and student participation. At the same time, each case also exposes the limits of the other. Guizhou highlights the importance of ethical grounding, cultural continuity, and systemic integration, but raises questions about critical inquiry and student agency. Scotland highlights participation and flexibility, but raises questions about uneven implementation, institutional support, and long-term coherence. The weight of the comparison therefore lies in what can be learned through contrast, rather than in treating either context as a universal model.

Guided by the six-part theoretical framework—including Constructivist Learning Theory, Ecological Systems Theory, Curriculum Theory, Holistic Education Theory, Xi Jinping's Thought on Ecological Civilisation, and Confucian Harmony Thought—this chapter draws on reflexive thematic analysis (RTA) to critically examine four key questions:

- (1) How is environmental education implemented in Guizhou and Scotland?

- (2) What forms of resistance do educators in each region encounter?
- (3) How are these resistances negotiated or overcome?
- (4) What conceptual similarities and divergences exist between the two models?

This section is organised into four parts. The first section compares how environmental education is embedded in curriculum and pedagogical practices in both regions, focusing on the top-down planning model of Guizhou and the teacher-driven approach in Scotland. The second section explores institutional and cultural resistances, including time constraints, exam pressures, and structural disjunctures. The third section examines how teachers in both contexts exercise professional agency to adapt, innovate, or circumvent these challenges. The final section compares underlying educational philosophies, revealing how divergent value systems—Confucian moral cultivation versus ecological justice and student empowerment—inform the conceptual framing of sustainability in each setting. Together, these comparisons allow for a richer understanding of how environmental education operates in culturally specific yet globally relevant ways.

4.3.1 Curricular Models and Pedagogical Pathways

One of the most striking differences between Guizhou and Scotland lies in the curricular structure and pedagogical orientation of environmental education. In

Guizhou, environmental education is not treated as a stand-alone subject, nor is it integrated primarily through interdisciplinary project-based teaching. Instead, it is commonly implemented through a permeation or osmosis-based approach, whereby environmental values and knowledge are diffused into other subject areas—especially moral education, civic education, and holistic development. This model reflects a value-led and state-guided educational orientation, where national discourses—such as ecological civilisation, harmony between humans and nature, and responsible citizenship—are subtly embedded into classroom discourse and school-wide practices.

Under this logic, environmental education serves not only to build ecological awareness but also to foster moral conduct, emotional cultivation, and civic discipline. As evidenced in interviews, teachers often describe activities such as “picking up litter,” “caring for plants,” or “organising green festivals” not in terms of ecological literacy but as opportunities to shape students into “kind,” “obedient,” or “grateful” individuals. Environmental education becomes a vehicle for moral formation and value transmission, deeply aligned with Confucian ethics and national cultural priorities.

However, this permeation-based approach, while fostering emotional resonance and cultural coherence, may also risk diluting the scientific and critical dimensions of

environmental education. Some teachers acknowledged that without formal subject status, environmental topics can be easily sidelined or absorbed into other moral objectives, leaving students with vague understandings of ecological systems or sustainability challenges. The lack of clear disciplinary boundaries may hinder the development of ecological literacy as a knowledge domain in its own right.

In contrast, Scotland's model—enabled by the Curriculum for Excellence (CfE)—emphasises teacher autonomy and interdisciplinary integration. Teachers design learning activities based on broad outcome statements “Experiences and Outcomes”, allowing them to incorporate sustainability into science, health, social studies, and outdoor education. This bottom-up, constructivist model sees the teacher as an active curriculum-maker, capable of contextualising global issues in locally relevant ways. Here, sustainability is approached as a pedagogical framework, not simply a value message.

Yet such autonomy also presents challenges. Several Scottish teachers noted the difficulty of translating broad policy intentions into concrete classroom practices without sufficient training, time, or collaborative structures. The “freedom to integrate” can sometimes translate into ambiguity, creating variation in implementation quality and teacher confidence. While the CfE framework positions teachers as

empowered designers of learning, it also places significant demands on their curricular judgement, interdisciplinary thinking, and capacity to balance multiple learning outcomes.

Viewed through ecopedagogical concerns, this comparison suggests that curricular embeddedness and teacher autonomy each create possibilities for environmental education, but neither is sufficient on its own to guarantee a critical or transformative orientation. In Guizhou, the osmotic approach gives environmental education a stable presence within everyday schooling by connecting it to moral cultivation, civic responsibility, and culturally familiar ideas of human–nature harmony. At the same time, when environmental issues are absorbed into broader value education, opportunities for students to critically examine ecological systems, environmental injustice, or the structural causes of degradation may remain limited. In Scotland, by contrast, curricular flexibility and teacher autonomy create stronger possibilities for inquiry-based, participatory, and locally responsive sustainability learning. Yet these possibilities depend heavily on teachers' confidence, institutional support, and available time. Without such support, autonomy may lead not to transformation, but to uneven provision and fragmented practice. This suggests that ecopedagogical potential is shaped not simply by curricular form, but also by how teachers are positioned within each educational system.

These two models therefore construct contrasting images of the teacher. In Guizhou, the teacher is primarily positioned as a moral cultivator and value transmitter, working within a vertically aligned and ideologically coherent system. In Scotland, the teacher is more often positioned as a knowledge broker and curriculum designer, navigating a more horizontal and pluralistic system. Both roles reflect broader cultural expectations and state–education relationships, shaping not only how environmental education is taught, but also what it is fundamentally meant to achieve.

4.3.2 Resistance and Response Strategies

While both Guizhou and Scotland share the goal of cultivating environmentally conscious citizens, teachers in both regions reported encountering various forms of resistance during the implementation of environmental education. These resistances arise not only from institutional or policy-level limitations but also from cultural attitudes, curriculum constraints, and workload pressure. However, the forms of resistance, their cultural roots, and the ways teachers negotiate them differ significantly between the two contexts.

Beyond logistical constraints, teachers in both contexts face what could be described as *moral labour*—a form of emotional and ethical work that stems from their

commitment to promoting values that are not always institutionally supported. Chinese teachers often bear the responsibility of harmonising state ideology, moral cultivation, and examination results, while Scottish teachers frequently navigate conflicting beliefs about science, ethics, and policy within pluralistic communities. The dissonance between their pedagogical aspirations and institutional or societal constraints creates a sustained sense of cognitive and emotional tension.

Both Chinese and Scottish teachers exhibit forms of *practical resistance*—quiet, adaptive strategies that allow them to preserve the spirit of environmental education without overtly challenging institutional constraints. In Guizhou, this may take the form of embedding environmental themes within character education or school rituals. In Scotland, it often involves framing controversial topics through neutral scientific discourse or project-based inquiry. These micro-negotiations reflect a form of *practical wisdom* (phronesis), where educators balance ethical convictions with contextual viability.

Teachers in both Guizhou and Scotland encounter a fundamental challenge: the absence of defined assessment criteria for environmental education results in its marginalisation within pedagogical practices. Educators in Guizhou have expressed apprehensions regarding their workload and the perceived significance of their contributions. In a test-focused environment, teachers must prioritise students'

academic achievement. Despite teachers from diverse disciplines striving to incorporate environmental issues, the proportion of content remains inherently constrained. This illustrates the conflict between “explicit” and “implicit” curricula in curriculum theory, where environmental education frequently has a marginal position in institutional goals.

Conversely, Scottish teachers face a distinct type of ambiguity. Despite the Curriculum for Excellence advocating for autonomy and flexibility, it is deficient in cohesive teaching resources and assessment frameworks, resulting in ambiguity in practical implementation. Emily noted, *“There is no standardised textbook, and no oversight regarding teaching methods—this can occasionally complicate matters.”* This institutional ambiguity imposes additional difficulties on less experienced educators. This disconnection aligns with ecological systems theory, where the exosystem (curricular policy) inadequately provides structural support to the microsystem (daily classroom practice).

Time limitations and class size present further practical barriers. In Scotland, the majority of primary school teachers tutor around 15 students per class, while instructors in Guizhou frequently oversee more than 30, occasionally reaching 40 students. *“It’s impossible to lead outdoor activities with so many children on my own,”* one Chinese teacher remarked. This significantly increases the safety and organisational burden in

outdoor or experiential learning, adding stress to teachers who must navigate both educational aims and student supervision.

Regarding the encouragement of interdisciplinary teaching and collaborative efforts in Scottish education policy, interviews indicate a disparity between aspiration and implementation. A significant number of teachers continue to function autonomously owing to insufficient coordinated preparation time. *“We do not collaboratively plan lessons, despite encouragement to do so; it ultimately becomes an individual endeavour,”* Rusty said. This reflects the disjunction of mesosystem structures in ecological systems theory: although national policy promotes collaboration, school-level timetables and organisational practices have not completely synchronised to facilitate it.

In Guizhou, teachers encounter internal conflicts influenced by the overarching framework of academic pressure and value systems. Notwithstanding an increasing focus on holistic education, the prevalence of exam-centric objectives persists in constraining the implementation of environmental education. Teachers frequently encounter a conflict between the moral-ethical principles they are urged to uphold and the institutional demands to prioritise test outcomes.

Instead of dismissing this conflict, Chinese educational discourse often seeks to reconcile it through cultural frameworks, particularly Confucian educational principles and Xi Jinping's Ecological Civilisation Thought. These frameworks promote a balance between the promotion of human virtues and environmental stewardship. In practice, environmental education is frequently integrated into character-building projects that necessitate coordinated assistance from families, schools, and the broader community. A teacher articulated, *"We discuss the harmony between humanity and nature, yet the transformation must initiate within the child, necessitating a multifaceted approach."*

This culturally ingrained method necessitates joint effort, but this requirement also engenders further opposition. Teachers have to deal with academic expectations as well as cultural, parental, and political interpretations of the meaning of environmental education. Although these frameworks confer moral legitimacy and consistency, they may obscure the emphasis on environmental education and augment the emotional and practical burdens on educators striving to implement it. This internal dissonance illustrates the interaction between the macrosystem and microsystem in Bronfenbrenner's ecological model: national ideology and cultural values establish expectations for the moral objectives of education, yet the actual implementation relies on teachers' personal judgement and the quotidian limitations of classroom dynamics.

On the contrary, while Scottish teachers possess enhanced curricular independence and pedagogical freedom, they remain subject to internal conflicts and cultural limitations. However, value conflicts related to environmental issues frequently emerge in nuanced yet impactful manners during classroom practice. James expressed concern, stating, *"I occasionally worry that discussing climate change may elicit discontent from parents,"* while Susan remarked, *"Certain parents believe these topics should not be introduced to children."* These considerations indicate that in the Scottish context, environmental education is not universally accepted but rather exists within a domain of conflicting values and societal expectations.

This tension is a fundamental principle of curriculum theory, positing that educators function not merely as executors of content but as intermediaries of ideology, power, and knowledge. In determining whether and how to instruct on climate change, ecological ethics, or global citizenship, teachers must balance professional judgement with the presumed cultural receptivity of their local communities. Many teachers have articulated in interviews that they are unable to consistently instruct in alignment with their personal pedagogical principles, as they must contemplate enquiries such as, *"Will parents endorse this?"* or *"Does this transgress an unspoken boundary within the school's cultural values?"*

In addition, although the Curriculum for Excellence (CfE) prioritises the cultivation of “responsible citizens” and “effective contributors,” this ideal frequently clashes with community standards and societal values. In religiously conservative or climate-sceptical regions, teachers may employ “strategic framing,” subtly integrating ecological principles through scientific or project-based perspectives to circumvent direct confrontation. This process of localising educational judgement exemplifies the interplay between the microsystem and exosystem as delineated in ecological systems theory, where overarching policy ideals are mediated by the quotidian realities and limitations of school environments.

Scottish teachers function under a framework of negotiated freedom, characterised by continuous compromise, boundary exploration, and socio-cultural interpretation. Their work is not devoid of political influence; instead, it is performed within the context of intricate social dynamics and evolving value systems. In contrast to Chinese teachers, who frequently encounter institutional limitations like performance demands and hierarchical directives, Scottish teachers grapple more with implicit social and cultural barriers that influence the acceptability and depth of sustainability teaching. Both situations require keen situational awareness and elevated educational discernment to actualise the principles of environmental education in locally feasible manners.

These dynamics underscore a fundamental tension at the heart of sustainability education: the space between policy vision, cultural norms, and pedagogical enactment. Teachers do not operate within a neutral environment—they function as mediators of contested values, policy agendas, and lived realities. Beyond logistical constraints, they often carry emotional and ethical burdens when trying to align personal convictions with institutional demands. These hidden forms of *moral labour* are frequently invisible in policy discourse yet crucial in shaping the depth and authenticity of environmental teaching.

In response, teachers in both contexts develop *adaptive strategies*. In Guizhou, environmental values are often wrapped within moral education or public service rituals. In Scotland, teachers may tactically frame contentious issues like climate change through scientific literacy or inquiry-based learning to avoid parental conflict. These “quiet strategies” reflect a pragmatic ethics of teaching—one that privileges professional judgement, cultural sensitivity, and long-term influence over immediate compliance.

An ecopedagogical reading extends this interpretation by showing that these forms of resistance are not merely practical barriers to implementation, but signs of deeper tensions around what environmental education is permitted to become within each system. In both Guizhou and Scotland, environmental education does not enter schools

as a neutral body of knowledge; it is filtered through existing expectations about morality, curriculum, family responsibility, community acceptability, and institutional accountability. In Guizhou, the embedding of environmental values within moral education and public service rituals gives EE cultural legitimacy, yet may also limit opportunities for students to examine ecological problems as social, political, and structural issues. In Scotland, inquiry-based and scientific framings can create space for discussion, but they also reveal how teachers must carefully manage parental expectations, institutional priorities, and the perceived contentiousness of climate-related topics. These quiet strategies therefore show both the agency and the constraint of teachers' work. They allow environmental education to continue within difficult conditions, but they may also keep it within the boundaries of what schools and communities already find acceptable, rather than fully opening it towards critique, dialogue, and collective ecological action.

4.3.3 Adaptive Strategies and Professional Reflexivity

Regardless of the diverse forms of resistance faced in Guizhou and Scotland, teachers in both regions proactively formulated coping mechanisms and exhibited significant reflexivity in modifying their environmental education methodologies. These responses are profoundly influenced by the institutional frameworks and cultural logics of their separate educational systems.

In Guizhou, where environmental education lacks official evaluation, teachers have adapted to present it through moral, civic, or health-related perspectives to validate its inclusion in congested academic curricula. As previously said, many teachers employ an osmosis-style approach, integrating environmental principles into fundamental topics including Chinese, ethics, music, PE and science. This embodies holistic education theory, which prioritises the comprehensive development of the child—intellectually, morally, and emotionally—through cohesive curricular experiences.

A teacher remarked: *“Although we do not offer dedicated environmental protection classes, we will address animal conservation when discussing ‘respecting life’ and examine water resources during our ‘hometown’ discussions.”* This merging of moral storytelling and societal relevance enables educators to circumvent inflexible exam-focused frameworks while preserving ecological dialogue. The impact of Confucian educational principles, which advocate for internal development via collaboration among family, school, and society, renders this moral framework particularly relevant in the Chinese context.

In Scotland, the Curriculum for Excellence facilitates pedagogical flexibility, enabling educators to create multidisciplinary, project-based modules that incorporate

sustainability without necessitating separate topic classification. Teachers frequently employ strategic ecological framing, choosing entrance points like health and wellbeing, outdoor education, or community collaboration to maintain engagement while addressing parental concerns.

Emily contemplated: *“We occasionally approach it from a mental health perspective—engaging with the outdoors and connecting with nature—prior to directly addressing climate concerns. It simply appears more effortless in that manner.”* This curriculum negotiation, influenced by professional judgement and cultural awareness, demonstrates the implementation of environmental education within localised micro-political ecologies.

In both places, the partnership between teachers and outside parties was crucial in diminishing isolation and enhancing resilience. In Guizhou, teachers indicated dependence on informal peer learning, WeChat groups, or district-organised thematic days to exchange ideas and sustain motivation. As one educator articulated: *“Occasionally, several of us instructors would convene a group to exchange our environmental conservation initiatives.”* These informal, educator-led communities address the deficiency of institutional support and exemplify mesosystem dynamics under ecological systems theory, wherein inter-school connections emerge as significant adaptive environments.

In Scotland, collaboration was frequently institutionalised via comprehensive school planning, interdisciplinary units, or alliances with environmental NGOs and Forest Schools. Alba stated, “*The National Park personnel assisted us in conducting a comprehensive full-day program on biodiversity.*” Such help significantly impacts outcomes. These external links enhance instructors’ educational resources while affirming the credibility of sustainability education for students and families alike. Nonetheless, constraints remain. Rusty remarked, “*There is an impetus for collaboration; however, we are not consistently afforded the time to plan effectively together.*” This disparity between policy objectives and actual execution highlights the conflict between exosystem directives and microsystem limitations in ecological systems theory.

Perhaps the deepest type of resistance mitigation is the formation of a reflexive professional identity, when teachers internalise sustainability as a primary moral concern. In Guizhou, this frequently manifests as a moral obligation supported by cultural and political principles. A teacher remarked: It is our duty as teachers to foster a sense of responsibility in our students. Environmental conservation is a crucial aspect of this. This sense of obligation corresponds with Xi Jinping’s Ecological Civilisation Thought, which advocates for educators to serve as proactive agents in the cultural shift towards ecological awareness.

In Scotland, a comparable sense of ethical pedagogical identity arises, frequently articulated through the concepts of global citizenship and democratic education. Jane articulated: “It is not just imparting knowledge regarding climate change; it is about empowering them to believe they can effect change.” This perception of human agency and ethical intent embodies constructivist learning theory, in which both teacher and student collaboratively develop knowledge and values within a dialogic framework.

Both cases demonstrate that resistance is not simply an obstacle, but a condition through which teachers develop adaptive professional judgement. Reflexivity becomes a means of transforming restriction into creativity, pressure into instruction, and policy into personal practice. This understanding of reflexivity can be extended further by considering not only how teachers cope with constraint, but also what kinds of environmental education their adaptive strategies make possible. In Guizhou, moral, civic, and health-related framings allow teachers to preserve ecological dialogue within an exam-oriented and policy-guided system, but they may also keep environmental education closely aligned with behavioural cultivation and social responsibility. In Scotland, health, outdoor, and community-based framings can open space for student participation, inquiry, and a stronger sense of agency, yet they also show how sustainability education must be negotiated within available time, institutional support, and local expectations. The adaptive strategies in both contexts therefore have a double function: they make environmental education workable within existing systems, while

also shaping the extent to which it can move towards more critical, participatory, and transformative learning. In this respect, teacher reflexivity is not only a response to constraint, but also an important site where the social purpose of environmental education is interpreted and reworked.

4.3.4 Conceptual Similarities and Differences in Environmental Education

In Guizhou and Scotland—two regions with distinct cultural and educational systems—the conceptual underpinnings of environmental education reveal both overlaps and tensions. These differences are not merely a matter of policy or curriculum, but stem from deeper societal understandings of educational purpose, the human–nature relationship, and the role of teachers.

Environmental education in Guizhou is frequently integrated with character development and moral improvement. Teachers include environmental topics alongside Confucian principles like *ren ai* (benevolence) and *jing tian ai ren* (respect for nature and people), establishing an ethical pedagogical framework. This methodology is grounded in holistic educational principles, considering environmental education as a means for comprehensive personal development. A teacher stated, “Environmental protection encompasses more than knowledge; it instils in children a sense of care and responsibility.” The incorporation of Xi Jinping’s ecological civilisation philosophy has

introduced a systematic structure and value orientation into environmental education, thus enhancing the policy support and contemporary relevance of ecological issues in classroom instruction. Educators utilise it as a means to foster students' feelings of accountability and civic engagement.

Whereas Scottish educators engage with environmental education via the lens of critical thinking and global citizenship, fostering student inquiry, questioning, and proactive engagement. The focus is on cultivating learners' agency and enabling them to perceive themselves as accountable participants. Jane remarked, "I desire for them not only to recall the term climate change but also to feel empowered to take action regarding it." This illustrates the impact of constructivist learning theory, which perceives students as active participants in the process of meaning-making.

The distinction between Guizhou and Scotland exemplifies two educational philosophies: one emphasising internalised moral growth and the other prioritising externalised reflective action. Guizhou's method prioritises emotional connection and self-regulation, whereas Scotland's model promotes analytical thinking, conversation, and public participation. This contrast also clarifies how sustainability is being interpreted differently across the two contexts. In Guizhou, sustainability is often understood as an ethical orientation that should be internalised through moral cultivation, emotional attachment to nature, and everyday behavioural responsibility.

This orientation is closely associated with the formation of disciplined, caring, and socially responsible subjects. In Scotland, sustainability is more often framed as a field of inquiry and public engagement, where pupils are encouraged to ask questions, evaluate evidence, and imagine themselves as participants in wider ecological and civic processes. These two orientations should not be treated as simple opposites. More precisely, they show that sustainability education may be directed either towards the internalisation of ecological responsibility, or towards more dialogic and action-oriented forms of ecological citizenship. The ecopedagogical significance of this comparison lies in revealing both the strengths and limits of each orientation: moral internalisation can create deep affective commitment, but may not always lead to critical questioning, while participatory inquiry can support agency, but may depend on whether pupils are given sustained opportunities to connect learning with collective ecological action.

While teachers in both areas emphasise the need to engage with nature, their interpretations of “nature” vary considerably. Teachers in Guizhou frequently embrace a relational perspective, perceiving humans and nature as fundamentally interconnected. This concept, grounded in classical Chinese philosophy like *tianren heyi* (the unity of heaven and humanity), influences teachers’ narratives and pedagogy regarding nature. A teacher said: *“Nature is integral to our being—we must cherish it as we do*

family.”This viewpoint embodies an ethically affective framework of human-nature interactions.

Scottish teachers, meanwhile, are more predisposed to embrace an ecological-systems perspective, perceiving nature as a complex network of interdependencies. In class, students are encouraged to evaluate causal relationships between human activities and ecological consequences, so cultivating systemic reasoning abilities. Rusty directed students to examine the causes of water contamination and its subsequent impacts on ecosystems.

The varying perceptions are not conflicting but rather exemplify culturally produced interpretations of nature: Guizhou’s emotionally-based ethical perspective differs from Scotland’s cognitive-analytical methodology, illustrating their distinct philosophical traditions—Confucianism and Western ecological science.

In Guizhou, teachers frequently assume the roles of moral exemplars and custodians of societal ideals. Their duties extend beyond information dissemination to include character development, ethical cultivation, and civic instruction. This position is intricately intertwined with the Confucian educational heritage and the overarching expectations of the Chinese educational system. Teachers generally structure

environmental education around normative enquiries concerning “what ought to be done” and position themselves as authority figures on ethical issues.

Meanwhile, Scottish teachers tend to perceive themselves as facilitators and co-learners, helping students through collaborative exploration. They underline pedagogical co-construction and student autonomy, in accordance with the democratic principles of the Curriculum for Excellence (CfE). James reflected, “*Our purpose is not to dictate their thoughts; rather, we aim to empower them to think independently.*” This redefining of teacher authority signifies a broader ideological transition towards learner agency and participatory learning within Scotland’s educational reform.

The variations in teacher identification not only mirror institutional environments but also expose differing social expectations regarding children’s agency and the fundamental objectives of education.

This chapter compares the experiences of primary school teachers in Guizhou and Scotland, highlighting the complex nature and implementation challenges of environmental education within varying cultural and institutional frameworks. Reflexive thematic analysis reveals that despite differences in policy, educational traditions, and resource availability between the two locations, instructors in both

contexts encounter analogous challenges in agency, values, and systemic negotiation. Guizhou's implementation strategy is characterised by a value-centric and integrative approach to environmental topics, incorporating them into comprehensive moral education and overall character development. This embodies a Confucian-influenced educational heritage. Conversely, Scottish educators utilise interdisciplinary approaches consistent with the Curriculum for Excellence, regarding sustainability as a curricular focal point linked to subject outcomes and student agency.

Teachers in both regions confront institutional and cultural obstacles: Guizhou teachers frequently face the marginalisation of environmental topics due to academic performance pressures, whereas Scottish teachers contend with conflicting parental expectations and ideological unease, despite having greater curricular autonomy. Guizhou teachers employ collective coordination, moral framing, and moral leadership to address these challenges, while Scottish teachers draw on professional discretion, project-based learning, and community partnerships to develop context-responsive environmental education. In educational philosophy, both contexts indicate a transition from the transfer of knowledge towards moral transformation and behavioural change. In a time of ecological crisis, environmental education increasingly serves to develop ethical agents, active citizens, and future changemakers, although this is pursued through culturally distinct yet partially convergent approaches.

This convergence does not mean that one model can be directly transferred to the other. Instead, the comparison suggests that what can be learned across the two contexts is not a complete model, but a set of contextually adaptable principles. The Guizhou case shows the value of ethical grounding, cultural continuity, and the integration of environmental responsibility into everyday school life. The Scottish case highlights the importance of learner agency, interdisciplinary inquiry, and opportunities for public or community-based participation. These elements cannot simply be borrowed without adaptation, because they are shaped by different policy histories, cultural expectations, and institutional conditions. Their value lies instead in clarifying how environmental education might be strengthened when moral responsibility, ecological understanding, critical reflection, and participatory practice are brought into closer relationship.

This comparative analysis demonstrates that environmental education is not a uniform global initiative, but a culturally contextualised process shaped by teachers' interpretations, professional agency, and local sociocultural conditions. When considered in relation to the wider aims of ecopedagogy, the comparison suggests that neither Guizhou nor Scotland should be understood as fully embodying a transformative model of environmental education. Its significance lies in showing that different educational traditions make different dimensions of sustainability visible, while also leaving certain possibilities underdeveloped. A more expansive approach to EE would therefore need to remain attentive to these contextual differences while

bringing ethical responsibility, ecological understanding, critical reflection, and collective action into closer relation.

Chapter 5: Conclusion

Environmental education (EE) in Guizhou and Scotland is not merely a separate educational endeavour; rather, it is a culturally ingrained practice influenced by historical, ideological, and pedagogical standards. The comparison data indicate that the "implementation" of EE cannot be generally defined, as it is invariably influenced by local epistemologies and normative expectations.

5.1 Reframing Implementation as Culturally Situated Practice

In Guizhou, environmental education is often integrated into the overarching moral and holistic education framework. Environmental values are integrated into daily instruction through allegories, moral narratives, and emotionally charged classroom rituals, rather than being treated as an independent subject. Teachers frequently serve as character developers, utilising Confucian principles of harmony and Xi Jinping's Thought on Ecological Civilisation to contextualise ecological consciousness as integral to moral growth. Environmental challenges are viewed as ethical obligations necessitating personal reform, communal accountability, and spiritual harmony with nature. This method reflects the Confucian tradition of self-cultivation and educational osmosis, wherein transformation initiates internally and extends outward.

On the other hand, the Scottish framework, within the Learning for Sustainability (LfS) paradigm, regards Environmental Education (EE) as a pedagogical change.

Scottish teachers integrate sustainability into topics such as science, social studies, and health & wellness through systematic inquiry, critical thinking, and community-based learning, rather than depending on implicit moral messages. Teachers perceive EE as a domain for learner autonomy, empowerment, and global citizenship. The integration of the curriculum is increasingly apparent, with a pedagogical focus on cultivating competencies instead of imparting moral values.

These two approaches demonstrate that environmental education, despite addressing universal issues, is never ideologically impartial. The implementation illustrates divergent educational paradigms: Guizhou's introspective style pursues harmony and moral integrity, whereas Scotland's extroverted model focuses on active engagement and comprehensive understanding. Both methodologies demonstrate the profound interconnection between environmental education and cultural values, as well as pedagogical perspectives.

5.2 Rethinking Barriers as Situated Tensions

Rather than interpreting implementation barriers as logistical failures or policy gaps, this study reframes them as situated tensions that arise from the intersection of cultural norms, institutional structures, and pedagogical values. Teachers in both Guizhou and Scotland experience resistance, yet the form and cause of these resistances are deeply shaped by local educational logics and sociopolitical dynamics.

In Guizhou, the principal conflict arises from the disparity between moral-educational objectives and the pragmatic demands of academic success. Teachers are anticipated to incorporate environmental principles into their curricula; yet, they concurrently contend with rigorous evaluation frameworks and substantial class sizes, frequently exceeding 30 students per class. This systemic constraint constrains opportunities for experiential or student-centred environmental education. Furthermore, in the absence of standardised assessments for environmental education, it is frequently relegated to instead of fundamental academic subjects. Therefore, while teachers are ethically dedicated to promoting environmental values, they frequently lack institutional backing and sufficient time to implement these initiatives. This conflict illustrates the overarching difficulty of harmonising Confucian holistic principles with a results-driven contemporary educational framework.

In Scotland, the tension arises not from an excess of curriculum but from socio-political uncertainty and community expectations. Although teachers enjoy freedom and reduced class numbers, some remain reluctant to tackle subjects such as climate change due to possible family opposition. Susan and James observed that environmental issues can be politically divisive. Teachers must balance fostering critical awareness with upholding perceived impartiality, particularly in places where environmental ideals are disputed. This contradiction illustrates the teacher's

intermediary role in developing knowledge within ideologically varied contexts, as identified by curricular theory.

Thus, barriers to environmental education are not solely practical challenges; they reflect profound societal and cultural conflicts. In Guizhou, the conflict exists between ambition and capability; in Scotland, it is situated between independence and ideological discord. Recognising these tensions as context-specific rather than universal facilitates a more nuanced and respectful comprehension of teachers' lived experiences and the intricacies of EE implementation. This also helps explain why the ecopedagogical possibilities of environmental education are unevenly realised in practice. In both contexts, barriers do not simply delay implementation; they shape whether EE can move beyond awareness-raising and behavioural guidance towards deeper inquiry, dialogue, and participatory action.

5.3 Reconceptualising Teacher Agency in Diverse Policy Contexts

In both Guizhou and Scotland, teachers do not just implement environmental education as mandated by regulation; they interpret, modify, and innovatively reconstruct it according to local limitations and opportunities. This section reconceptualises teacher agency as a dynamic and responsive force, influenced by and simultaneously influencing the broader systems in which it operates.

In Guizhou, despite instructors adhering to a rigid curriculum with stringent moral standards, they exhibit agency by reinterpreting environmental education as a means of moral growth and comprehensive development. Environmental concerns are integrated into daily instruction through culturally resonant narratives, such as Confucian principles of harmony (he xie, 和谐) and collective responsibility. Educators implement themed events, community initiatives, and family-oriented practices despite systemic limitations. Their agency is relational—exercised within and encouraged by a broader moral education framework that integrates home, school, and community collaboration. This corresponds with Bronfenbrenner’s ecological systems theory, in which mesosystemic links (e.g., parent–school collaboration) serve as crucial conduits for the enactment of environmental education.

Additionally, in both scenarios, teacher agency is not only an issue of human volition but a relational and systemic occurrence. It is co-produced by policy frameworks, cultural logics, and professional ecosystems. Recognising this enables us to perceive teachers not only as passive users of policy but as critical pedagogues and cultural interpreters who render sustainability significant within their distinct teaching contexts.

5.4 Towards a Pluralistic Vision of Environmental Education

This concluding observation acknowledges the absence of a solitary or universally applicable framework for environmental education. The Guizhou and Scottish cases illustrate that sustainability education gains local significance when interpreted through unique cultural, policy, and pedagogical frameworks. This study advocates for an inclusive viewpoint that appreciates the diversity of educational objectives, methods of involvement, and ethical frameworks, rather than seeking a singular “best practice.”

In Guizhou, environmental education is frequently utilised as a means of moral development, influenced by Confucian principles, holistic education, and the rhetoric on national ecological civilisation. Teachers serve not only as conveyors of knowledge but also as ethical mentors, with environmental education contributing to a comprehensive initiative of character cultivation and societal cohesion. This combination of environment and morality reinforces a longstanding legacy in Chinese education: the cultivation of responsible citizens through community values. Although it may seem limiting from a Western viewpoint, it fosters profound, emotional kinds of participation that align with students’ life experiences.

On the other hand, the Scottish model emphasises learner autonomy, critical thinking, and localised agency. Environmental education is regarded as a dynamic, progressive process influenced by students’ enquiries, teachers’ creativity, and community participation. Sustainability is not only taught but implemented and enacted

through daily behaviours, ranging from forest-based education to climate activism initiatives. This approach exemplifies an educational system that prioritises professional judgement and democratic principles, despite facing challenges such as curricular inconsistencies and community opposition.

Considered alongside the ecopedagogical concerns discussed in the findings, these two cases also show that transformative environmental education cannot be reduced to either moral formation or participatory inquiry alone. Guizhou's approach demonstrates the importance of ethical grounding, emotional attachment, and culturally meaningful responsibility, while the Scottish case highlights the value of dialogue, learner agency, and community-based action. The contribution of an ecopedagogical reading is therefore not to rank one model above the other, but to clarify what each makes possible and what each may leave underdeveloped. A more pluralistic vision of EE would need to connect ethical responsibility with ecological understanding, critical reflection, and opportunities for collective action.

This comparison further demonstrates that environmental education is inherently non-neutral. It is perpetually intertwined with political, cultural, and ethical significances. What is important, therefore, is not to universalise one form over another, but to learn from differences—comprehending how various systems foster ecological awareness in contextually relevant and pedagogically sound manners. As the climate

catastrophe grows more intense, the ability to tailor environmental education to diverse circumstances emerges as both a pedagogical necessity and a worldwide ethical obligation.

5.5 Limitations

While this study offers rich insights into the lived experiences of primary school teachers engaging with environmental education in Guizhou and Scotland, several limitations must be acknowledged. These constraints do not invalidate the findings but rather help situate them within a specific methodological and contextual frame.

The research draws on a relatively small, purposive sample of teachers from selected schools in each region. While in-depth interviews provided rich, nuanced data, the limited number of participants constrains the generalisability of the findings. Teachers' perspectives may not fully reflect regional diversity, particularly in larger or more heterogeneous regions such as Guizhou. Similarly, the Scottish sample, while varied, represents a fraction of national experiences.

The data reflect a specific moment within broader educational policy contexts. In China, the evolving role of ecological civilisation within national discourse may influence how teachers frame their pedagogical practices in the coming years. Similarly, in Scotland, policy shifts—such as changes to Curriculum for Excellence or funding

for outdoor learning—may alter the implementation of Learning for Sustainability (LfS). Therefore, the findings capture a snapshot rather than a longitudinal process.

Cross-cultural research entails challenges in translation and interpretation. While efforts were made to retain the authenticity of teachers' voices through careful transcription and bilingual analysis, cultural nuances and idiomatic expressions may still be partially lost or recontextualised. This limitation is particularly salient in comparing culturally embedded concepts such as “moral education” or “sustainability”.

As the researcher holds an interpretive role in analysing teacher narratives, their own cultural background, educational training, and theoretical commitments inevitably shape the thematic construction. Reflexive thematic analysis (RTA) foregrounds this subjectivity as a strength, yet it also calls for ongoing awareness of potential bias. Readers should remain attentive to how meaning is co-constructed between the researcher and the participant.

5.6 Suggestions for Future Research

This research has shed light on how environmental education is interpreted, implemented, and challenged in two distinct sociocultural contexts—Guizhou and Scotland. However, it also opens up several avenues for future inquiry, particularly in

addressing the limitations and deepening the theoretical, comparative, and practical understanding of sustainability education.

Several teachers in both Guizhou and Scotland expressed a desire to understand the long-term effects of environmental education on students. Future studies could adopt longitudinal designs to track how students' values, behaviours, and ecological literacy evolve across educational stages—from primary to secondary school and beyond.

This Research compared two specific regional settings. Future research could expand the comparative scope to include other provinces in China or other countries with diverse policy regimes and cultural values. This would enhance our understanding of how local ideologies, historical narratives, and governance models shape the practice of environmental education globally.

The study revealed innovative cross-subject approaches among Scottish teachers and value-based integrations in Guizhou. Future research could investigate how interdisciplinary models are developed, tested, and scaled up. In particular, action research with teachers designing and implementing such curricula could provide practical insights. By focused on teachers' narratives. Future research could triangulate

data by including voices from students and parents to understand how environmental education is received, interpreted, and acted upon in different cultural contexts.

There is a need for more critical work interrogating the ideological underpinnings of environmental education. Future research could examine how concepts like ecological civilisation (in China) or global citizenship (in Scotland) operate as political signifiers in education, and how educators navigate these tensions.

In addition, future research would benefit from a multi-sited, multi-vocal approach that captures the internal diversity of each region, rather than treating Guizhou or Scotland as monolithic educational spaces. Comparative designs that include both urban and rural schools, schools serving different socioeconomic communities, or institutions with varying degrees of curricular autonomy would help illustrate how environmental education is locally interpreted, negotiated, and adapted. This shift from “national comparison” to intra-regional complexity would deepen our understanding of educational practices and identities.

Moreover, there is considerable value in adopting methodological pluralism to access the subtle cultural textures embedded in environmental learning. Ethnographic strategies—particularly critical ethnography and cultural semantic analysis—can illuminate tacit values, embodied rituals, and relational norms that may remain hidden

in policy analysis or interview data. These approaches enable researchers to capture the symbolic and affective dimensions of pedagogy, such as the emotional resonance of Confucian moral storytelling in Guizhou or the dialogic inquiry embedded in Scottish outdoor learning.

By incorporating these layered and interpretive strategies, future research can move beyond surface-level comparison to explore how environmental education becomes meaningful within lived cultural worlds. This is essential not only for theoretical development but also for designing culturally responsive pedagogies that align with learners' local realities and moral landscapes.

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Appendix: List of Participating Teachers

Pseudonyms	Academic Subject	Years of Teaching	Region
Dai	Chinese Literature & English	5	Guizhou, China
Feng Miao	Music	6	Guizhou, China
Liu Gang	Mathematics & Science. Head of School	22	Guizhou, China
Lu	Science	24	Guizhou, China
Liao Xiaoxiao	English	16	Guizhou, China
ZhangXi	Chinese Literature	12	Guizhou, China
Lijun	Chinese Literature	20+	Guizhou, China
Libang	Mathematics	21+	Guizhou, China
WangYang	Mathematics	17	Guizhou, China
Wang	Chinese Literature	23	Guizhou, China
Tian yuan	PE	5	Guizhou, China
Shi	PE	3	Guizhou, China
Dong Fenlin	Chinese Literature	20	Guizhou, China
Chenxi	Mathematics	4	Guizhou, China
Nao Shufy	Chinese Literature	2	Guizhou, China
Huang	Mathematics & Science	3	Guizhou, China
Wang	Art	11	Guizhou, China

Zhang	PE	2	Guizhou, China
Li Fei	Science	1	Guizhou, China
Alba	Class teacher, health and wellbeing, outdoor PE	23	Scotland
Alice	delivering outdoor education	3	Scotland
Emily	Learning for Sustainability recognition with the GTCS	just finished probation year	Scotland
James	Science, Math, Principle Teacher	15	Scotland
Jane	Project Lead in Learning for Sustainability	4	Scotland
Linda	Principal teacher	26	Scotland
Rusty	Just finished PGDE	15	Scotland
Susan	Deputy Head	30	Scotland