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評估台灣環境教育法：對未來政策的考量

Assessing the Taiwan Environmental Education Act:
Considerations for Future Environmental Education Policy

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Assessing the Taiwan Environmental Education Act: Considerations for Future
Policy

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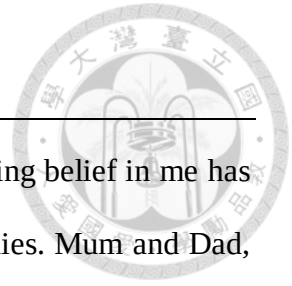
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Abstract (中文)

在過去的五十年裡，越來越多的共識認為需要集體努力來應對人為引起的氣候變遷。自 2011 年 6 月 5 日起，環保署（EPA）將環境教育（EE）當成推動社會變革的方法並納入國家法律。這項政策名為《臺灣環境教育法》（TEEA），旨在通過獎勵、命令和資源動員來促進環境教育，同時團結各種從業人員，以實現行為改變和可持續發展性。然而，調查數據顯示，儘管已經實施了十多年，TEEA 並未顯著改變一般民眾的多項環保行為。通過利益相關者分析和情景式訪談，本研究旨在進一步了解 TEEA 的成果，以及它如何支持和加強臺灣的環境教育。最後，研究將確認出在未來環境教育政策的制定中應考慮的因素。

關鍵詞：環境教育政策，臺灣環境教育法，行為改變，政策評估

Abstract (English)

Growing consensus within the past fifty years has identified the urgent need for collective efforts to tackle human-induced climate change. The pervasiveness of environmental education (EE) as a means to drive social change in Taiwan has been maintained as a national law by the Environmental Protection Agency (EPA) since June 5th, 2011. Entitled the Taiwan Environmental Education Act (TEEA), this policy aims to promote EE and unite diverse practitioners through a system of incentives, mandates, and resources, to achieve behavioural change and sustainability at large. However, survey data reveals that despite over a decade in operation, the TEEA is not accompanied with a significant change in several pro-environmental behaviours of the general public. Using stakeholder analysis and scenario-based interviews, this research seeks to further understand what has the TEEA achieved, and how does it support and enhance the delivery of EE in Taiwan. Lastly, it will determine what factors should be considered in the development of future EE policy.

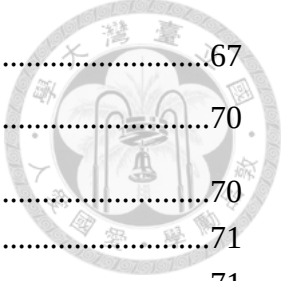
Keywords: *Environmental Education policy, Taiwan Environmental Education Act, behavioural change, policy evaluation*

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Chapter 1: Introduction

Growing consensus within the past fifty years has identified the urgent need for collective efforts to tackle human-induced climate change. Alongside the United Nation's establishment of the 2030 Sustainable Development Goals, global initiatives to mitigate humanity's impact on Earth have reaffirmed the importance of first understanding complex issues before devising their solutions. Education, therefore, is at the heart of environmental action. Only with sufficient awareness and knowledge of an issue will the required political influence and financial resources be mobilised to address it. This long-standing movement has led to the development of Environmental Education (EE), a multidisciplinary approach that draws upon scientific disciplines to promote sustainable living.

The pervasiveness of EE as a means to drive social change has been fortified as national law in eight countries, three of which reside in East Asia (Saito, et al. 2019). Compared to programs in Japan and Korea which are either decentralised, voluntary or self-funded, the Taiwan Environmental Education Act (hereby TEEA) is currently the only nationwide and centrally-enforced initiative with secure funding and board review annually (EPA, 2010, 2017).

Enacted on June 5th 2011 as a joint venture by the Environmental Protection Agency (EPA) and Ministry of Education (MOE), the TEEA states that any institution which derives more than 50% of its funding from the government – including but not limited to government agencies, state-run enterprises, academic institutions and non-profit organisations - is required to train personnel to design EE programs and deliver at least four hours of EE a year. In addition to certification training and a penalty system for environmental law violations, the TEEA has transformed the way EE is conducted by

engaging civil society and the private sector to achieve its goals. As Article 1 states, the TEEA's purpose is:



“...to promote environmental education, assist citizens to understand the[ir] interaction[s]...with the environment, and enhance the environmental awareness, environmental ethics, and responsibility of the nation...to cultivate environmental citizens...[and]achieve sustainable development.”

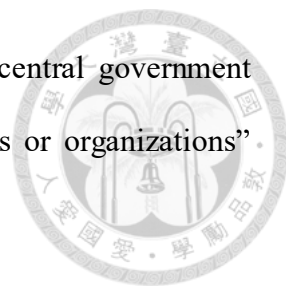
The ambitions of the TEEA are compound and far-reaching, harnessing the influence of both formal and informal education to reach an audience of “*the entire citizenry, various organizations, enterprises, government agencies (institutions) and school districts*” (EPA, 2010, 2017). The TEEA prioritises components such as “awareness”, “ethics” and “responsibility” to foster a conducive setting for civic participation and social justice.

Taiwan's innovative use of policy for EE demonstrates the nation's strong commitment towards sustainable development. However, amidst emerging economic challenges, political conflict, technological advancements and increasingly severe environmental problems, the TEEA must now prepare for an uncertain future to fulfil its responsibilities and achieve its goals.

1.1 Terminology

Traversing the fields of epistemology, pedagogy, psychology, ethics, and philosophy, the terminology in EE may lack theoretical nuance and depth if not clarified. Therefore, this study defines its concepts based on prominent theories in the field and the legislation under study.

Each research subject or dimension is defined as follows:

- 
- An *Environmental Education Entity* is “what the competent central government authorities have certified of agencies (institutions), enterprises or organizations” (Article 3, paragraph 2 in EPA, 2011, 2017)
 - *Environmental Attitudes* are the “psychological tendencies of a person that manifest themselves as preferences for the natural environment or an evaluation response” (Fang, Hassan and LePage, 2023, p110).
 - *Environmental Values* are “concepts or beliefs...about desirable end states or behaviors...that transcend specific situations..., guide selection or evaluation of behavior and events [and] are ordered by relative importance” (Schwartz and Bilsky, 1987, p551).
 - *Pro-environmental Behaviour* is “behavior that consciously seeks to minimize the negative impact of one’s actions on the natural and built world (Kollmuss and Agyeman, 2002, p240)

The defined terms above were chosen as complementary indicators of the TEEA’s performance based on its stated purpose. If environmental awareness is enhanced, then positive attitudes towards the environment will emerge. Likewise, if environmental ethics are engaged, then positive values about the environment will be held. Lastly, if a sense of responsibility is nurtured, then the frequency of pro-environmental behaviour will increase.

1.2 Research Background

While the unique approach of the TEEA has not escaped academic attention, relatively few scholars have researched the policy itself. Several studies have provided comprehensive accounts documenting the history of the TEEA in Taiwan (Chang, 2016)

and the development of EE for both formal education (Kao, Kao, and Tsai, 2017) and non-formal education (Hsu, 2017). For its policy system, Saito, et al. (2019) have highlighted the unique approach and innovation of the TEEA through cross-country comparisons of similar laws in East Asia.

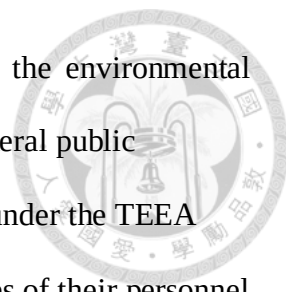
The outcomes of the TEEA have been evaluated, albeit through certification and performance metrics such as rates of participation, types of programs, and self-reported engagement (EPA, 2017). Lee, Lee and Popuri (2020) further provide insight into its “implementation status” through a summary of EE certification statistics for institutions, facilities, and personnel from 2011 to 2019. Their findings suggest that, although certificate rates are increasing over time, there is still a geographic disparity in the accessibility and dissemination of EE which specifically affects higher education and corporate entities.

To understand the process of implementation, the day-to-day experiences of EE personnel in Taiwan have also been explored. Huang, Harvey and Asghar’s (2021) paper criticised the administrative burden, financial control, passive engagement, and indiscernible outcomes associated with the TEEA. The researchers argue that the policy in its current form is restrictive and performative in practice as public relations take priority and undermine its original purpose.

1.3 Research Aims and Questions

The purpose of this research is to investigate and evaluate the effectiveness of EE policy in Taiwan. It will provide an overview of the TEEA’s impact on the *general public* and identify the *critical factors* affecting the present and future of EE delivery.

To facilitate analysis, the following research aims were constructed:

- 
- To determine the impact of the TEEA through changes in the environmental attitudes, values, and pro-environmental behaviour of the general public
 - To identify the outcomes of current EE programs facilitated under the TEEA
 - To explore the potential of EE entities through the experiences of their personnel

The results of these aims will then answer the research questions (RQ) below:

1. To what extent was environmental education policy a sufficient and effective measure in causing a behavioural change in Taiwan from 2011 to 2020?
2. In what ways does the TEEA support and enhance the delivery of EE?
3. What are the current and future critical factors affecting EE entities and personnel?

The research findings provide evidence to address these questions from several temporal perspectives: past, present, and future. The impact of the TEEA will be determined by a statistically significant change aligned with its goals, thus indicating that the TEEA has contributed or at least is concurrently existing alongside positive behavioural change. If a change is not observed, the realised and unrealised outcomes of past programs could suggest how the policy currently affects EE entities and the public's access to EE facilities and resources. As TEEA-mandated evaluations primarily consist of photographs, participant numbers, participant surveys and budget reports, this study aims to contribute an additional assessment of program performance. Furthermore, the discussion of future programs will reveal what aspects require policy reform and highlight areas for development.

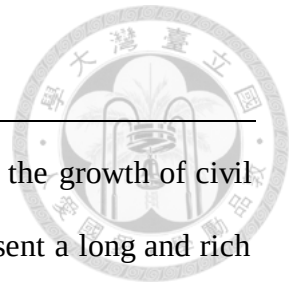
1.4 Research Value and Motivation

The originality of this research lies in its progressive focus and multiple targets of analysis. By evaluating the TEEA, this research will provide clarity on the performance of EE policy and highlight considerations for policymakers to facilitate effective reform.

Any government-enacted law, regulation or policy seeks to address social issues through targeted intervention and available resources (Majchrzak, 1984). Simultaneously a product and process of the policy cycle, evaluation is necessary to determine whether or not a policy has any influence on the problems it attempts to solve. Only by understanding the impact, implementation and influencing factors of policy are governments then able to refine, amend or even suspend processes for the improvement of social well-being and sustainable development (Hassel, Anke, and Wegrich, 2022).

With this vision of social and environmental change in mind, this research is aligned with the Agenda 2030 UN Sustainable Development Goals and addresses Goal 4 (Quality Education, target 4.7), Goal 12 (Responsible Consumption and Production, target 12.8), and Goal 13 (Climate Action, target 13.3).

Chapter 2: Literature Review

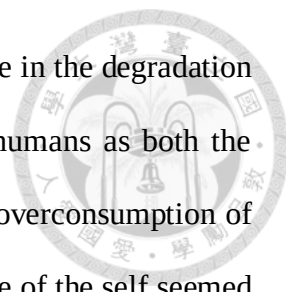


Environmental education (EE) is a form of education closely tied to the growth of civil society and our epistemic exploration of it. The origins of EE represent a long and rich history in the theoretical development of knowledge, skills and philosophy across numerous disciplines relating to the environment. While our understanding of nature remains an inseparable part of anthropological history, the progression of EE outlines collective efforts to ignite, transform, and manage humanity's relationship with the natural world.

2.1 The History of Environmental Education

The conceptualisation of EE as an independent discipline arose through the integration of the “environment” with “education” in the 1970s. Many scholars believed that pedagogical approaches should be employed to give the environment a central focus within other scientific disciplines (Tilbury, 1995). By positioning nature at the heart of education, teachers could present ecology and environmental action as intimately connected to daily life. Coinciding with the increasing prevalence of *systems thinking*, popularised by reports such as *The Limits to Growth* (1972) by Meadows et. al., EE assumed a dynamic interdisciplinary role with an emphasis on observation and investigation.

Ecological knowledge, that is, comprehension of ecological concepts and principles, came to be understood as the foundation for making informed decisions on the environment. In the influential and widely cited work, *The Concept of Environmental Education* (1969), Stapp et al. suggest that as citizens become more aware of environmental issues, they will naturally become more “motivated to work towards their solution” (p.34). Like many early theorists of EE, William Stapp (1930-2011) adopts a



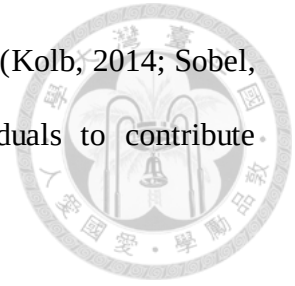
human-centric perspective that portrays humans as the principal force in the degradation and regulation of ecological relationships. This sentiment frames humans as both the ultimate cause and solution to environmental problems due to their overconsumption of resources. As this idea took greater prevalence, a fundamental change of the self seemed needed to re-establish equilibrium states in nature.

2.11 Educating for the Environment

Despite the initial attention given to resource management, scholarship on human-nature interactions was relatively rare until the 1980s. Interest in these relationships has only continued to grow with subsequent findings that prove meaningful connections with nature can improve health and well-being outcomes (Soga et al, 2020). Although these positive impacts soon became well-known, the loss of biodiversity associated with urbanisation and technological advancements presented new challenges for EE. As termed the *Extinction of Experience* by ecologist Robert Pyle (1947-), an increasing lack of contact with nature became associated with diminishing care for the environment (Miller, 2005). EE thus developed a new focus on the mental, emotional, and spiritual conditions of our surroundings. For highly urbanised areas, dwindling access to green spaces for younger generations became a priority for government officials.

The appeal for a true sense of interdependency and connection between humans and nature coincided with the development of outdoor education. Primarily composed of *place-based* and *experiential* education, outdoor education aims to use sensory engagement, observation and problem-solving to solidify learning opportunities as life experiences (Fang, Hassan and LePage, 2023). While *experiential* learning emphasises out-of-classroom practices such as internships, field trips or action-based projects, *place-based* education aims to localise learning by using the surrounding community

and environment as a stimulus for discussion and practical learning (Kolb, 2014; Sobel, 2004). Together, these methods prioritise the agency of individuals to contribute towards community well-being through applied tasks.

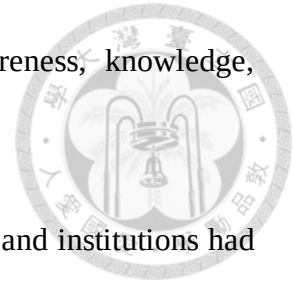


2.12 Empowering Environmental Education

From the late twentieth century onwards, postmodernism fostered EE's engagement with critical theory and ethics. Philosophers such as Arnes Naess (1912-2008) argued against the man-in-environment concept, instead presenting *deep ecology* as a perspective that embraces a “relational, total-field image” that is universal and interpersonal in scope (Naess, 1973, p95). He proposed that locally developed solutions that address social issues such as power and inequality are essential to promote the inherent value of all living beings. Thus, Naess championed a movement to combat what he perceived to be a superficial engagement with a limited range of environmental issues like pollution and resource management. According to Naess, humanity needed a forward-thinking egalitarian, decentralised and collaborative approach to address modern challenges.

To establish greater consensus on EE, the United Nations Educational, Scientific and Cultural Organization (UNESCO) held the world's first intergovernmental conference on EE in Tbilisi, Georgia on October 14-26th, 1977. A general assembly composed of 265 delegates and 65 representatives signed the *Tbilisi Declaration*, a document defining the framework and principles of EE (UNESCO, 1997). Within this document, EE was defined as a holistic “lifelong education” to improve civilian quality of life and stimulate action for environmental protection (p24). This declaration extended the means of delivering EE to embrace current issues through long-term participation. The

goals of EE were therefore clarified into five objectives: awareness, knowledge, attitudes, skills, and participation.



With the objectives and aspirations of *EE* established, governments and institutions had to translate its principles into practice. Shortly after the *Tbilisi Declaration* was signed, academics Hungerford, Peyton and Wilke published the *Goals for Curriculum Development in Environmental Education* (1980) which outlines through the consensus of experts how EE programs should be implemented into formal education. The five objectives outlined in the *Tbilisi Declaration* were consequently arranged into four successional dimensions: Level 1 for “ecological foundations knowledge”; Level 2 for “awareness of individual and collective actions”; Level 3 for investigation and evaluation of solutions and values; and Level 4 for skills for “positive environmental action” (p43-44). By providing a foundational framework for curriculum and program development, governments around the world could begin incorporating EE into policy.

2.13 Environmental Education and Sustainability

The association of EE as a pathway to sustainable development is reflective of each concept’s concurrent development in academia and governance. As the social, economic, and political dimensions of environmental issues became undeniable, sustainable development became an approach that could balance limited resources against the needs of a growing population. In 1987, the United Nations published the Brundtland Report, also known as *Our Common Future*, to unite action through “development that meets the needs of the present without compromising the [needs] of future generations” (p16). This statement recognised society’s overconsumption of natural resources and inequitable distribution of their derived benefits. Sustainable development took focus again in *Agenda 21*, a comprehensive action plan announced in 1992 at the United

Nations Conference on Environment and Development (UNCED). Through these commitments, sustainable development became a new aspirational target.

Affirming the potential of EE to inspire pro-environmental action, the UNEP subsequently declared sustainability education a global priority from 2004-2014. As stated in their strategic plan, *Decade of Education for Sustainable Development*, EE should encompass “all aspects of education, communication and training for sustainable development” to realise the link between theory and practice (UNEP, 2005, p7.). Through this plan, the UNEP broadened the potential sources of EE to include adaptive training for emerging challenges and issues. With several shared goals, concepts and theories, the model of *Education for Sustainable Development* (ESD) became interlinked with environmental education and earned a place in the 17 Sustainable Development Goals (SDGs) to be achieved by 2030.

2.14 Legislating Environmental Education

The emergence of EE in Taiwan, like many countries, arose due to increasing concern for locally experienced environmental issues. Following the nation’s rapid economic growth in the 1970s, industrial pollution and natural disasters resulted in hazards that required significant intervention. In conjunction with the government, civil eco-protection groups organized and began promoting information to mobilise the public into action (EPA, 2011a). At the same time, conservation values took even greater precedence with the establishment of the first national park in Southern Taiwan, Kenting National Park, in 1983. This milestone defined a new platform for institutional and public engagements with environmental education, which became a formal agenda with the founding of the Environmental Protection Agency (EPA) a few years later in 1987 (Kao et al., 2017).

Prior to the TEEA, the EPA and MOE separately addressed public demand for formal and non-formal programs tailored to Taiwan's specific needs. MOE continued to formalise EE in schools and in 1990 established an "Environmental Protection Unit" with the sole purpose of promoting EE (Kao et al., 2017). This unit drafted a national curriculum and mobilised guidance groups for coast-to-coast expansion.

With this landmark decision, EE formally entered policy frameworks and developed from the 1990s onwards. In 1993, the EPA commissioned a report investigating the need to legislate EE. As Huang and Asghar explain in their 2021 paper, despite the report's findings supporting the development of formal policy, there was a lack of parliamentary support at the time. It was only until the early 2000s when the fines collected from environmental pollution fines accumulated to a significant amount did the government consider how to distribute and manage the vast financial resource. An initial draft of the TEEA was proposed in 2005 to establish a national environmental education fund and impose regulations on how entities could receive and utilise it. However, the proposal was rejected again by the Legislative Yuan. Two years later, the idea was picked up by presidential candidate Ma Ying-jeou (2008 to 2016) as a key campaign promise to further Education for Sustainable Development (ESD). After his election in 2009, the bill was immediately passed through the Legislative Yuan and the Taiwan Environmental Education Act was formally enacted on June 5th, 2011.

Due to Taiwan's political position and desire for global recognition, the government has increasingly attempted to pursue international diplomacy through environmental initiatives (Huang, Harvey and Asghar, 2021). In addition to global recognition, parliamentary meeting notes suggest that the TEEA was designed to address public distrust and "conspiracy" in national environmental actions (Legislative Yuan, 2010a:

372, as in Huang and Asghar, 2021). Therefore, the purpose and targets of the TEEA became compounded under a singular policy: manage local public relations, align with international conventions, and unite diverse practitioners for behavioural change.

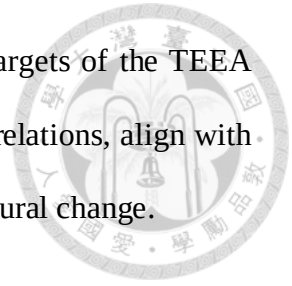
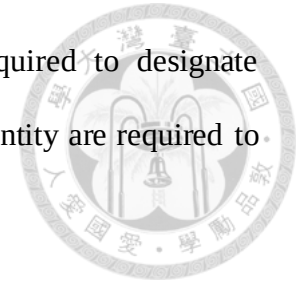


Table 1 – Structure and Content of the TEEA (EPA, 2011, 2017)

<i>Chapter</i>	<i>Article</i>	<i>Theme</i>	<i>Regulation</i>
Chapter One	1-4	Principles	• Aims and Targets • Authority (government, municipal and county) • Definitions
Chapter Two	5-7	Policy	• National abstract reform every 4 years • Action plans for implementation • Annual reporting of execution results
Chapter Three	8-17	Authority Responsibilities	• Funding and budget allocation • Certification of institutions, venues, and personnel • TEEA Board review and development • EE entity representative appointment • EE facilities and resources • Intergovernmental collaboration • School program and curriculum development • EE Personnel privacy and compensation
Chapter Four	18-22	Incentives and Rewards	• Requirement to designate EE personnel • Requirement to develop and execute EE programs • Incentives for private and public participation • Additional rewards for performance • Support for research
Chapter Five	23-24	Penalties	• Environmental law violations • Failure to fulfil TEEA requirements
Chapter Six	25-26	Supplementary Provisions	• Details defined by related authorities • Enactment and amendments

Composed of 6 chapters, 26 articles and 17 items (Table 1), the TEEA is a legislative system of five measures: participation, research and development, advisory support, certification, and financial incentives/penalties. It states any institution that receives

more than 50% of its funding from government sources is required to designate personnel to design and deliver EE programs. All members of the entity are required to complete at least four hours of EE a year.



A national EE action plan was drafted to ensure efforts are aligned with the policy's objectives. Renewed every four years by an EE guidance group comprised of experts, scholars, and industry representatives, each plan consists of 10 strategic approaches and 43 items which outline various implementation measures as well as a statutory and estimated budget per scope period.

Table 2 – Statutory/Estimated Budgets by Year for EE (per 1000 NTD) with Relative Contributions from the Environmental Protection Fund (EPA, 2014, 2016, 2022c)

Year	Type	Total Spending	Environmental Protection Fund	% of Total	% Change from Previous Year
2012	Statutory Budget	618,445.40	249,641	40.37	N/A
2013	Statutory Budget	660,588.20	280,150	42.41	12.22
2014	Estimate	669,506.60	302,585	45.20	8.01
2015	Estimate	704,330.60	342,077	48.57	13.05
2016	Statutory Budget	717,867.83	358,911	50.00	4.92
2017	Estimate	914,800.63	494,325	54.04	37.73
2018	Estimate	847,962.03	420,000	49.53	-15.04
2019	Estimate	838,741.23	420,000	50.08	0.00
2020	Statutory Budget	942,070.93	465,581	49.42	10.85
2021	Estimate	955,940.30	468,979	49.06	0.73
2022	Estimate	977,554.31	468,979	47.97	0.00
2023	Estimate	982,672.91	468,979	47.72	0.00

As Table 2 shows, the TEEA has mobilised significant sums of money across over 30 governmental ministries and agencies since 2012. Total government spending has increased every renewal period with the, now formalised, Environmental Protection Fund (EPF). The EPF is sustained by fines generated from environmental law violations and continues to finance around half of total spending. The decrease in the proportional contributions of the EPF in 2018 can be attributed to with the law amendments made in the previous year. The EPA covers their implementation of the TEEA with the EPF while other governmental bodies must derive financial resources from public funding.

According to Article 7 of the Environmental Education Enforcement Rules, the EPF supports thirteen law provisions (EPA, 2011). Excluding the TEEA, these include physical environmental factors including the Air Pollution Prevention and Control Act, Indoor Air Quality Management Act, Noise Control Act, Water Pollution Prevention and Control Act, Marine Pollution Prevention Act, and Waste Disposal Act.

Certification for institutions, venues, and personnel, is a process that allows for registration of EE activities and access to this funding. In 2022, Article 10, paragraph 2 was revised to reduce the required training hours for personnel certification from 120 to 100 hours (EPA, 2022a). For certified venues, the Environmental Protection Fund is available to support a pre-determined list of EE activities. The consequences of non-compliance include either a fine of 5,000-15,000 NTD, or the requirement to attend 1-8 hours of environmental protection seminars by the offender or accountable individual.

Following its enactment in 2011, early iterations of EE curriculums in Taiwan focused extensively on pollution and were largely modelled after comparable programs in the United States (Chang, 2016). Initially, the incorporation of EE into the national curriculum in 2011 was restricted to Grades 1-9 students, but in 2015 the program was expanded to include Grades 10-12 students (Chang, 2018). Although effective in enhancing environmental literacy, internal evaluations revealed courses had limited influence on pro-environmental behaviours (EPA, 2018 as cited in Hsu, 2017). This led critics to question the prioritisation of formal programs, which did not take full advantage of the experiential experiences offered by informal institutions such as zoos, museums, and recreational parks (Hsu, 2017).

As a result of these investigations, Articles 19, 22 to 24, and 26 of the TEEA were revised in 2017 (EPA, 2010, 2017). The penalty system was revised to reduce infraction

rates and the MOE and Ministry of Science and Technology (MOST) were instated as partner central authorities to the EPA. In addition, these amendments adjusted the accepted delivery mediums of EE to be more inclusive of outdoor education and out-of-classroom experiences, resulting in a visible change in the activities provided.

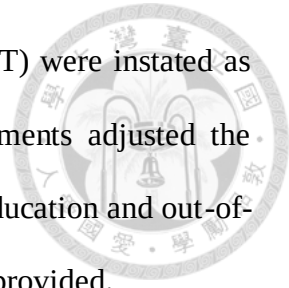


Table 3 – TEEA-Facilitated EE Activities by Type and Percentage from 2011-2019

(Adapted from Lee, Lee and Popuri, 2020)

Activity Type	2011	2012	2013	2014	2015	2016	2017	2018	2019	Trend
Course	18	15.1	14.19	15	11.79	10.72	10.82	10.08	9.52	
Lecture	11	10.56	9.07	9	9.54	8.92	8.24	9.35	8.95	
Seminar	1	0.95	0.69	1	0.7	0.76	0.72	0.66	0.78	
Online Learning	3	2.8	3.71	4	6.29	7.89	8.69	3.82	8.08	
Experience	10	10.26	14.21	14	16.72	16.76	16.42	19.21	19.51	
Internships	1	0.43	0.38	1	0.86	1.1	0.96	1.12	1.16	
Outdoor Activities	3	5.87	5.83	6	6.5	7.26	7.83	8.98	9.11	
Visit	16	16.67	7.34	7	7.85	7.74	6.45	-	-	
Movies	10	9.88	9.23	9	9.91	9.42	9.87	9.67	9.17	
Practice	14	15.54	17.36	17	21.25	22.79	23.16	27.67	26.07	
Other	13	3.24	17.26	1	8.58	6.54	6.85	9.49	7.66	

As shown in Table 3 above, the types of activities facilitated by EE entities in service of the TEEA have changed in relative proportions from 2011 to 2019. Passive-engagement activities such as courses, lectures, and seminars have generally decreased during this period. In comparison, active-engagement activities including experiences, internships, outdoor learning, and practical tasks are increasing. Watching movies continues to comprise around 9-10% of EE activities as of 2019. It is notable that as a result of law amendments, site visits were not included from 2018 onwards. This change coincides with increases in experiences and outdoor activities, alongside a decline in online learning the same year. Online learning, however, quickly regained its relative percentage in 2019 associated with the outbreak of COVID-19 that year. In the following years of the pandemic, the majority of EE was conducted online. In 2022, from July to August the minimum requirement for civil servants was met by a 4-hour

online program and text comprising a thematically related movie organised by the Higher Education Evaluation and Accreditation Council of Taiwan (HEEACT, 2024).



2.2 Theorising Environmental Education Policy

To evaluate policy is to understand the relationship between the inputs and outputs of social intervention (Hassel, Anke, and Wegrich, 2022). While policy inputs may include funding, resources, service provision, strategic guidelines and so forth, its outputs usually seek to solve a fundamental problem and bring about a required change. Policy for behavioural change has been utilised widely in health promotion, such as campaigns against obesity, drug addiction and smoking (Tummers, 2019). However, its application in environmental education is a relatively novel endeavour.

Governments can employ a variety of policy instruments to promote behavioural change. As summarised by Tummers in *Public Policy and Behavior Change* (2019), these instruments are broadly categorised as incentives, bans and mandates, and public education campaigns. Firstly, incentives refer to attainable benefits, whether tangible or intangible, to motivate desirable behaviour. These incentives are often monetary, however, the efficacy of financial rewards remains debatable (Miche, Stralen and West, 2011). Secondly, bans and mandates refer to interventions where the government utilises legal orders to discourage or encourage a behaviour, typically through penalties for non-compliance. These include indoor smoking bans or even compulsory education for certain age groups. Thirdly, public education campaigns aim to establish new cultural norms through communicating information about the desirable behaviour. This is a form of socialisation that appeals to the rational aspects of decision-making.

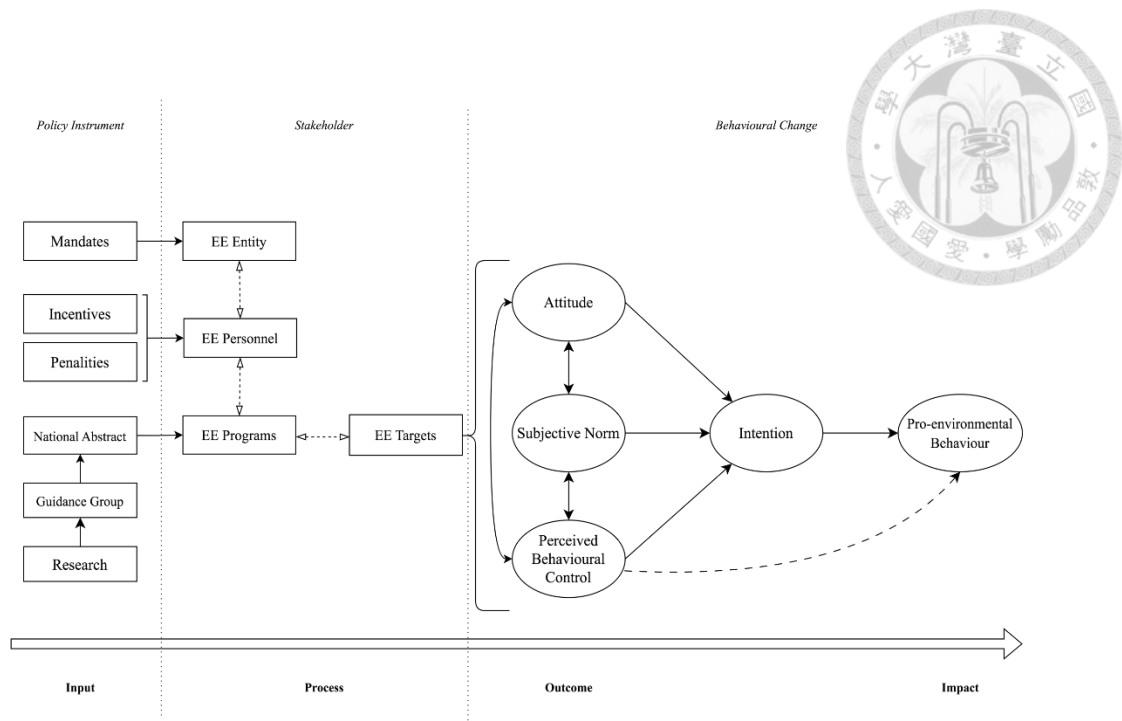
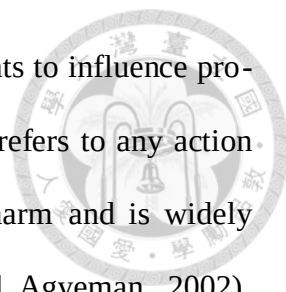


Figure 1–TEEA Policy Inputs, Process, Outcomes, and Impact

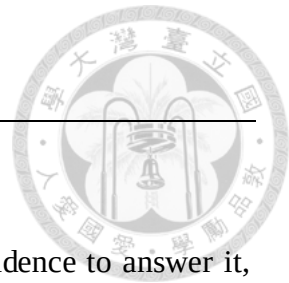
2.21 Policy Instruments: Theory of Planned Behaviour

One predominant theory that aims to explain decision-making and action is the *Theory of Planned Behaviour*, first proposed by Icek Ajzen (1942-) in 1985. According to Ajzen, human behaviour is determined by attitudes, subjective norms, and perceived behavioural control which, in sum, produce the intention to act (Ajzen, 1991). Attitudes refer to the positive or negative associations of a particular behaviour as related to its outcome. Subjective norms capture the social pressures of an action, including the expectations of others and how important it is for the individual to meet those expectations. Perceived behavioural control is the level of difficulty, ease, and ability to which an individual can perform in context. It is argued that individuals with higher intent are more likely to accomplish and repeat a particular behaviour. Therefore, the task of behavioural change policy is to generate enough intent and intrinsic motivation within an individual by targeting these different psychological aspects of behaviour.



In the context of EE policy, the TEEA combines all three instruments to influence pro-environmental behaviour (Figure 1). Pro-environmental Behaviour refers to any action that either benefits the environment or mitigates environmental harm and is widely accepted as imperative to achieving sustainability (Kollmuss and Agyeman, 2002). Therefore, the structure of the TEEA demonstrates many links between the theory and practice of behavioural change using EE entities as an intermediate link to targets. The government provides EE and incentives to establish positive associations with pro-environmental behaviours in order to improve environmental attitudes. The TEEA's mandates also establish new subjective norms, furthering social pressure to comply and become a self-sustained system. Finally, its research and programs facilitated by EE entities should promote pro-environmental behaviour as achievable and sustainable, enhancing perceived behavioural control and intent. The outcomes of this policy process would therefore be higher rates of pro-environmental behaviour.

Chapter 3: Methodology



3.1 Research Design and Framework

To connect an investigative line of inquiry with the appropriate evidence to answer it, effective research design is crucial (Gorard, 2013). Situated within the social dimensions of EE policy research, this study adopted a mixed-methods design to contextualise quantitative and qualitative results for policy reform and development. The principal methods were statistical analysis, stakeholder analysis, scenario-based interview and claims analysis.

3.2 Pilot Study

A pilot study was conducted from September 2022 to May 2023 to consider the value of this research and the efficacy of its tools. This included the quantitative analysis of 18 variables from two national surveys and two interviews conducted in person on 12/05/22 and 05/03/2023.

The first interview utilised a semi-structured question guide to facilitate conversation on issues related to TEEA adherence and EE. This interview was held with a curator of a museum exhibition hosted in accordance with the TEEA. An intelligent verbatim style of transcription was used, followed by several rounds of open and axial coding due to the exploratory nature of the study.

The second interview utilised a structured scenario-based question guide to explore how current and potential EE programs are delivered by an international NGO with specific EE goals. This survey aimed to capture organisation context (e.g. actors, interactions, goals), program contributions (e.g. realised, unrealised), and critical factors for consideration.

As a result, four major adjustments to the research design were made: (1) survey variables were classified into EE dimensions based on their theoretical engagement, (2) an exploratory semi-structured interview was replaced with a scenario-based interview, and (3) the research scope was adjusted to include the potential of EE in Taiwan.

3.21 Pilot Study Participants

Phaedra Fang is a curator in the Education Department of the National Taiwan Museum. For over eight years, she has worked as a Research Assistant and Curator at the Nanmen branch, a certified EE venue by the EPA since 2013. Her special exhibition, *Sustainable New Year's Dinner Tables: Dining in the Anthropocene*, was held from August 2021 to October 2023.

Kelly Ko is the Executive Director of the Jane Goodall Institute (JGI) Taiwan. Established in 1998, Ko has worked within the international NGO for over 20 years and is responsible for promoting the Roots and Shoots program in Taiwan. In addition, she oversees the Jane Goodall Sustainability Academy, an experimental school for grades 1-5 in Wanhua, Taipei City.

3.3 Stakeholder Analysis

Stakeholder analysis is a valuable means of understanding the motives, interests, and power of actors within the decision-making and implementation of policy. With a prospective focus, this evaluation is based on Varvasovszky and Brugha's (2000) recommendations which highlight purpose and time frame as key factors. Therefore, this analysis assumes a medium-term timeframe orientated towards policy development and achieving the goals of the TEEA.

All identified stakeholders were plotted into a matrix based on their degree of interest and influence towards the TEEA (Figure 2). This categorisation provides a valuable framework for analysis when considering the enforcement, delivery, and potential of EE.

Stakeholders identified as *high-interest* and *high-influence* are the governing authorities of the TEEA who have the most influence in policy reform and enforcement including the Environmental Protection Administration (EPA), the Ministry of Education (MOE) and the Ministry of Science and Technology (MOST). However, stakeholders identified as *high-interest* and *low-influence* include personnel and the state-funded entities subject to the regulations of the law. Those with *low-interest* but *high-influence* may include politicians, industrial organisations and the media who must be persuaded or forced to actively engage in EE. Lastly, stakeholders with *low-interest* and *low-influence* typically include the targets of EE such as the general public, schoolchildren or employees at corporations with specific Corporate Social Responsibility (CSR) goals.

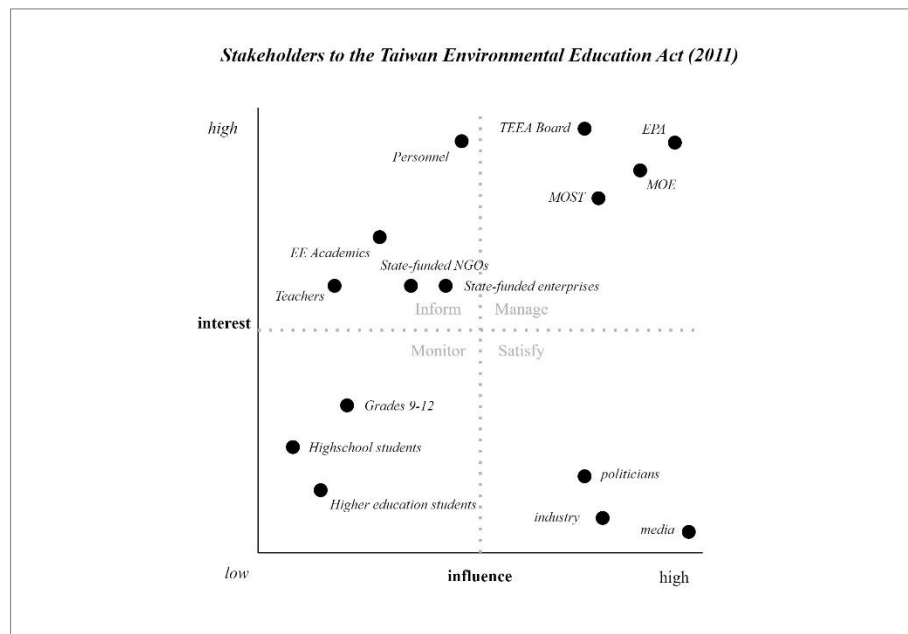


Figure 2– Identified stakeholders to the TEEA (EPA, 2011, 2017) (Hsu, 2017) (Chang, 2016)



3.31 Subjects of Research

Based on the findings of stakeholder analysis, four main stakeholder groups were identified. These actors are either directly (primary stakeholder) or indirectly (secondary stakeholder) affected by the TEEA or influenced policy implementation themselves (key stakeholder). Tertiary stakeholders such as industry and the media were not included in the scope of analysis as although they may incorporate and cover EE initiatives, they are not mandatory participants under the law unless a violation of environmental protection law is made. Under these instances, the violator becomes an EE target.

The subjects of research are therefore categorised in Table 4 below:

Table 4 – Characteristics of Research Subjects

<i>Type</i>	<i>Stakeholder group</i>	<i>Interest</i>	<i>Influence</i>	<i>Research Q</i>
Secondary	Targets	low	low	1
Primary	EE Entities and Personnel	high	low	2
Key	Central authorities e.g. EPA	high	high	3

Each stakeholder group will be the focus of a corresponding research question. According to the EPA-managed website *Environmental Education Lifelong E-learning*, as of 2023, there are 250 recognised EE entities in Taiwan (EPA, 2010b).

3.4 Research Aim 1: Assessing the Impact of the TEEA

To determine the impact of the TEEA since its enactment in 2011, a comparison of survey results from 2010 and 2020 was conducted. This data was composed of cross-sectional samples of the national population. As this analysis compares non-equivalent groups, findings may only suggest causal relationships at a national scale. However, its

conclusions are strengthened by its large sample (n=2209, n2=1822) and robust data preparation.



3.41 Data Sources

Datasets were obtained through open access to the International Social Survey Program (ISSP) conducted by the GESIS Leibniz Institute for the Social Sciences. Four available surveys on “Environment” were found, representing the years 1993, 2000, 2010, and 2020. As Taiwan only participated in 2010 and 2020, others were excluded. Information regarding the survey data and its collection is shown in Table 5 below:

Table 5 – ISSP Data Background Information

<i>Year</i>	<i>Period</i>	<i>Fieldwork Institute</i>	<i>Sample</i>	<i>File</i>	<i>indicators</i>
2010	11/07-23/09	Center for Survey Research	2209	ZA5500	58 (21 unique)
2020	21/06-05/01	Institute of Sociology	1822	ZA7650	56 (19 unique)

Fieldwork for each twenty-two question survey was conducted by Academia Sinica on behalf of ISSP as part of a larger annual survey called the “Taiwan Social Change Survey”. However, this dataset is unavailable at this time due to delays in data processing and release.

3.42 Variable Selection

A total of 37 corresponding variables in both datasets were filtered to ensure results could be directly compared (Appendix A). Of these, 11 did not align with the selection criteria and were not included. The remaining 26 variables were categorised based on three constructed themes: *Environmental Attitudes*, *Environmental Values* and *Pro-Environmental Behaviour* (see section 1.1.).

These themes were based on the stated definitions for each dimension and the survey's scope which covers "*attitudes towards environment related issues...behavior and respondents' preferences regarding governmental measures*" (ISSP Research Group, 2019). For this reason, a theme related to environmental knowledge or awareness was not constructed.

3.43 Demographic Characteristics

In the current body of EE research, demographic attributes including age, gender and education attainment are shown to have a significant impact on behavioural outcomes (Fang, Hassan and LePage, 2023). At the individual level, younger people tend to be more favourable to environmental action than their elders; women consistently outperform men in pro-environmental behaviour and higher education is associated with higher environmental literacy (Liang et al. 2018). However, as the TEEA's target audience remains inclusive at the national level, this study maintains its intended scope. Controls for demographic factors were not used but samples are assumed to be representative based on comparable ratios of sex and age.

3.44 Statistical Analysis

To prepare data for analysis, the original dataset for each survey was filtered to remove unwanted variables and then combined before statistical tools were applied. The resulting outputs were then formatted and visualised.

The Mann-Whitney U-test was used to determine if there was a statistically significant difference between a randomly selected value from both datasets for each variable. This non-parametric test was chosen to compare distributions because sample populations were independent (Singh, 2006). Cohen's D-test was also calculated to determine the degree of difference. A Standardized Effect Size value between 0.2-0.5 was considered

small, 0.5-0.8 medium, and over 0.8 large (Singh, 2006). An alpha level of 0.05 was used for all tests.



3.5 Research Aim 2: Identifying the Outcomes of TEEA-Facilitated Programs

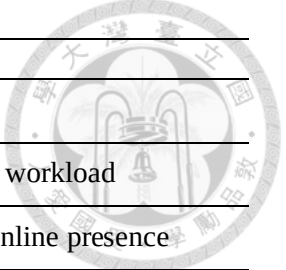
To deconstruct the enforcement system of the TEEA into its component parts and stakeholders, government documents and reports were analysed. The personnel of EE entities were the chosen subjects for interview due to their degree of influence and interest as revealed by stakeholder analysis. As *high-interest* and *low-influence*, they will experience the highest degree of regulation by the law yet have the most interaction with targets.

3.51 Participants

A total of 45 organisations were invited to participate in the study. Of these, the email contact information for forty organisations was retrieved from the EPA directory *Environmental Education Lifelong E-learning* (EPA, 2010b). Another three individuals were notified via an intermediary contact of the researcher and two were personal contacts of the researcher.

Each organisation was sent an email introducing the researcher and study and provided details regarding their involvement through two documents: a participant information sheet and a consent form. If no response was received before the stated deadline of 5-10 business days from initial contact, a reminder would be sent to confirm their receipt of the invitation. If no response was received, a final email would be sent after 5 business days to close the invitation.

Table 6 – Participant Recruitment Statistics



Result	N	Reason
No answer	25	N/A
Refused	8	Lack of experience (<1 year), high workload
Unable to contact	2	Incorrect contact information, no online presence
Accepted but not completed	5	No answer, lack of availability
Accepted and completed	5	N/A

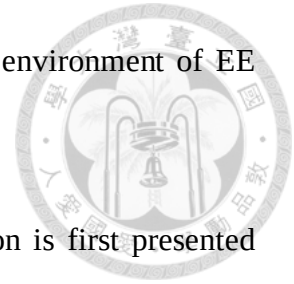
All interviews were scenario-based and completed between August 31-November 10, 2023, with an appointed representative from five organisations. Each representative would receive announcement of the interview topics and questions beforehand, with the request to prepare materials or information to support their responses. Each interview lasted 1-1.5 hours and took place online using Google Meets with the primary researcher and the researcher assistant Jing-Ting Lin (林敬庭) present. Permission to record the meeting was granted by all participants.

The audio files from each meeting were downloaded onto a secure computer before the original files were deleted. All interview scripts were transcribed using the open-access platform Riverside AI and translated from Mandarin Chinese into English using Deep L.

3.52 Scenario-based Interview

A scenario-based interview is a creative inquiry technique that recognises interviews as a collaborative and interpretive process between participant and researcher (Haynes et al, 2009). It utilises both structured and semi-structured elements to capture multi-actor systems and complex settings, usually reported through subjective self-assessment and less reliable when extrapolated out of context. The strength of scenario-based interviews over other formats is their function as a formative and summative assessment of one

entity on a system, that is, the TEEA's influence on the working environment of EE personnel.



To conduct a scenario-based interview, the prospective organisation is first presented with an organisation profile and a formal request to participate. This profile will include a summary of all accessible data about the organisation for them to verify and detail what information the researcher is seeking to allow the participant adequate time to prepare supporting materials. An interview guide will be used to ensure consistency in format and content (Appendix B).

Each interview will last approximately 1-1.5 hours, comprising of four sections:

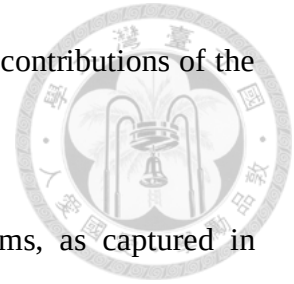
1. Current scenario (organisational interactions, roles, setting and goals)
 - a. Scenario claims (measurable, tangible, intangible and unrealised contributions)
2. Envisioned scenario (current or future actions lacking support)
3. The Six-Sector approach (critical factors or predicted threats)
4. The Seven-Question approach (issue prioritisation and future planning)

An intelligent verbatim style of transcription will be used to enhance the clarity of responses. Participants will have the opportunity to correct or redact statements prior to data processing.

3.53 SWIMS and Claims Analysis

This research utilises an adapted version of the Scenario Walkthrough and Inspection Methods (SWIMS) approach, as employed by Haynes et. al. (2009). The process of SWIMS involves contextualising a 'system' through a scenario to provide detail regarding roles, tasks, goals, and functional features. Scenarios link the context and

outcomes of programs through “claims” which represent the stated contributions of the system (Appendix C).



Claims analysis is the process of collating and interpreting claims, as captured in scenarios depicting real multi-stakeholder settings (Haynes et. al, 2009). Claims can provide key insight into the stated positive and negative consequences of interactions. The management of internal systems and resources reveals institutional priorities and capabilities, while the perceived relevance of critical factors represents external threats and future considerations.

The functionality of claims analysis allows for a range of analyses. Claims can be collated across multiple users to establish common themes, or even compared by organisation type to highlight context-specific challenges.

There are four types of claims: measurable, tangible, intangible and unrealised contributions. Measurable claims offer concrete examples of quantifiable contributions, such as visitor numbers or workshops held. Tangible claims may reflect contributions that are agreed upon but not directly countable, such as satisfaction or enjoyment. Intangible claims are similarly outcomes that are not quantifiable but capture unintended or external outcomes such as media coverage. Lastly, unrealised claims represent unmet task goals or targets.

3.6 Research Aim 3: Exploring the Potential Contributions of EE Entities

To assess the potential of EE in Taiwan, this study draws inspiration from *Scenario planning: strategic interviews and conversations* which documents the application of scenario-based interviews in evaluating environmental policy (Ratcliff, 2002). Data collection for this aim will be combined with the methodology for Research Aim 2.

3.61 Critical Factors: The Six-Sector and Seven Questions Approach

John Ratcliff provided a guide for scenario planning based on his experience conducting twelve studies exploring the design, testing and implementation of environmental policies. Ratcliff utilised two lines of inquiry, termed the “Six-Sector” and the “Seven-Questions” approach.

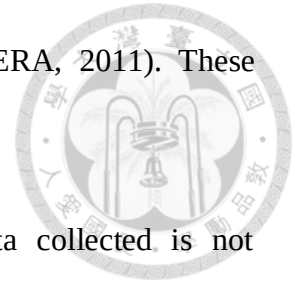
The Six-Sector approach introduces questions to trigger discussion on critical factors relating to culture, demography, the economy, environment, governance, and technology (Appendix B). These questions use the same grammatical structure and are logical, systematic and direct in tone and delivery. The Seven-Questions approach, however, uses a more emotional and personal manner to elicit the same information in an unstructured way.

When combined, these approaches can verify responses using two complementary but distinct formats to appeal to different participants and communication styles. This reinforces the reliability and validity of responses as statements should be comparable in content. An adapted form of the Seven Questions approach was used, with the removal of two questions that are discussed in earlier sections of the interview. These questions are “What major constraints do you experience inside/outside the organisation?” and “If all constraints were removed, what would you do?” (comparable to Section 4, envisioned scenario description).

3.7 Research Conduct and Ethics

Adherence to ethical standards and proper research conduct is necessary to protect the integrity of research as well as the safety and well-being of participants. The Code of Ethics of the American Educational Research Association (AERA) lists five key principles for education researchers including professional competence, integrity,

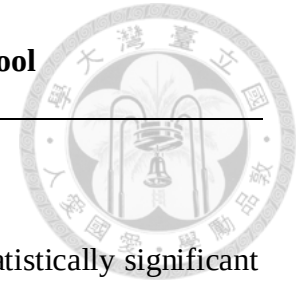
responsibility, respect for peoples, and social accountability (AERA, 2011). These guidelines were followed throughout.



The research risk for this study is considered low as the data collected is not controversial, emotional or sensitive in nature. Statistical analyses used anonymised data collected by an external international research institute and any primary data collected by the researcher did not include identifiable information. All participants completed tasks that were within the expected cognitive and physical capabilities of their age and background.

The group vulnerability is also considered low because all interview participants were adults and had no prior conditions that would affect their capacity to give free, informed and continuous consent. Several interview participants held public-facing roles which could be associated with a degree of professional vulnerability. Therefore, participants were given anonymity and opportunities to clarify, redact or alter their responses. All interview transcripts are not available to the public, but can be requested from the office of the International College, National Taiwan University.

All research procedures were approved by the supervising researcher Helen K. Liu. The researcher passed training administered by the Ministry of Education Center for Taiwan Academic Research Ethics Education (AREE) on December 29th, 2022.



4.1 Research Aim 1: Assessing the Impact of the TEEA

Comparing 2010 and 2020, the results (Appendix D) show that a statistically significant change was present within a 95% confidence interval for 9 out of 18 variables (Q2, 3, 6, 7, 9, 11, 12, 13, 16). The standardised effect size for each was considered small (<0.5) and the average standard deviation was 0.81 and 0.80 for 2010 and 2020, respectively.

4.11 Change in Environmental Attitudes and Values

Visualisation of the selected theme variables shows the distribution of responses for 2010 and 2020 based on a nominal Likert-type scale [data format (2010, 2020)].

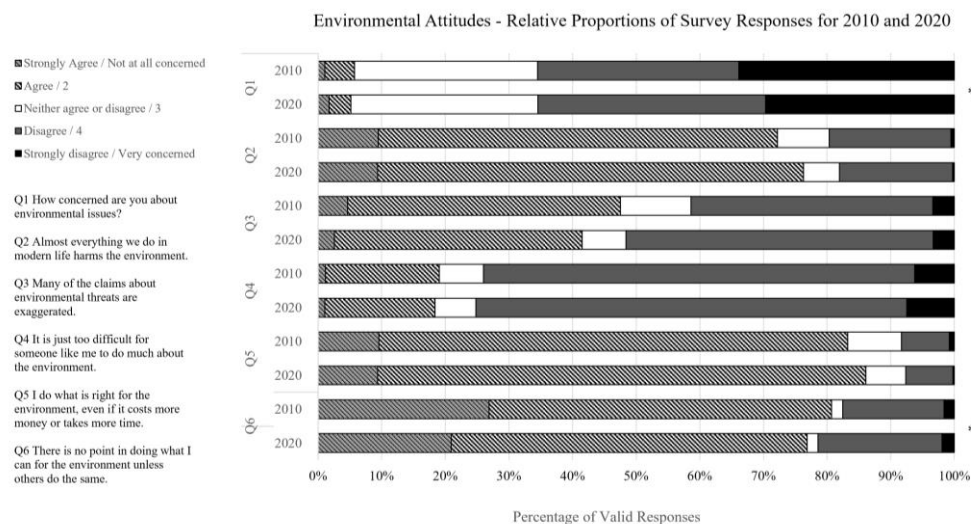
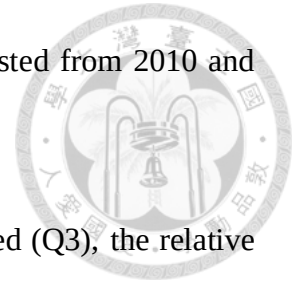


Figure 3—ISSP Survey Responses: Environmental Attitudes

For the theme of Environmental Attitudes (Figure 3) results show that a 65% majority of respondents were *concerned* to *very concerned* about environmental issues (Q1) with over 70% stating that modern lifestyles harm the environment (Q2). A statistically significant increase of 3.11% was shown for Q1 *agree* and *strongly agree* in 2020, but

conversely, a high proportion of mid-scale responses (25>%) persisted from 2010 and 2020.



When asked whether claims of environmental threats are exaggerated (Q3), the relative proportions of overall agree, neither agree nor disagree, and overall disagree, were fairly equivalent from 2010 and 2020. In 2010, a slight majority of 47.52% overall agreed compared to 41.37% which overall disagreed for Q3. However, the proportion of overall disagree grew by 10.10% in 2020.

Relating to perceptions of individual capacity (Q4), over 80% of respondents believed that it was not too difficult for them to make a significant contribution and that they were committed to environmental action despite its costs (Q5). However, a similar proportion of respondents (80.68, 76.87) also stated that their actions were undermined if other people did not also act (Q6). This proportion significantly decreased in 2020 by around 4%.

For the theme of Environmental Values (Figure 4), responses relating to the willingness of participants to accept economic trade-offs varied (Q7, 8, 9). A slight majority of participants were willing to accept a reduction in their standard of living (Q9) (54.11, 65.53) but were overall unwilling to pay higher taxes (Q8) (57.59, 57.51). A statistically significant change is shown in willingness to pay higher prices (Q7), decreasing from a majority to 46.02% in 2020 with mid-scale responses increasing from less than 1% to 7.24%. Similarly, very unwilling responses for Q9 significantly decreased in 2020.

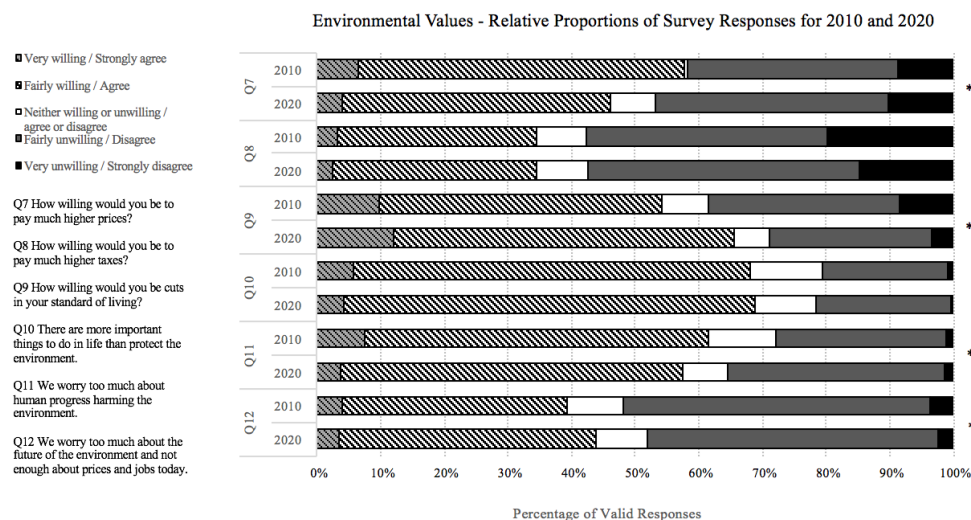


Figure 4—ISSP Survey Responses: Environmental Values

When evaluating human progress and the environment (Q11), most respondents stated people worry too much despite a significant reduction of around 4% in overall agree for 2020. When comparing the prioritisation of prices and jobs (Q12), the ratio of overall agree to disagree was relatively low, significantly decreasing in 2020 with neither holding a majority.

4.12 Pro-Environmental Behaviour

To evaluate pro-environmental behaviour, survey responses stating inconsistent action or inaction were highlighted (Appendix E). The most frequently conducted action was recycling with only 13.99% stating they “Sometimes” or “Never” recycle in 2010, significantly reducing to 8.73% in 2020 (Q13). Comparing infrequent and refused recycling behaviour, “sometimes” responses decreased by 5.37% in 2020 and “Never” responses increased by <1%. The majority of participants did not avoid products for environmental reasons (59.57%, 62.07%) (Q14).

Overall, direct pro-environmental behaviours were relatively rare with no more than 10% of respondents stating they had environmental group membership (Q15); or signed a petition, donated, or protested for a related cause within 5 years of the survey date (Q16, 17, 18). The highest significant change of -4.97% was for Q16, meaning more respondents signed petitions in 2020.

4.13 Invalid responses

The number of invalid responses differed by survey year and theme (Appendix F). By survey year, the average percentage of “Can’t choose” or “No answer” responses calculated from statistically significant variables was 0.38% and 0.76% for 2010 and 2020, respectively. In comparison by theme, the lowest percentage was for Pro-Environmental Behaviour at 0.08% and the highest for Environmental Values at 1.79%, with Environmental Attitudes at 1.16%.

Chapter 5: Program Outcomes and Potential



5.1 Current Scenario: Organisational Context

Participants were invited to describe a program conducted within the past year under the TEEA that they were proud of (Table 7). Four participants readily offered examples while Participant C stated they could not offer an example they were proud of. Instead, they described a program they perceived to be the most effective in achieving its goals.

Table 7 – Current Scenario Program and Relation to Participant

	Position	Role	Program Goals	Format
C	Interpreter	<i>Volunteer Trainer, Volunteer Manager</i>	<i>fulfil TEEA requirements</i>	<i>Other – volunteering</i>
E	Assistant Researcher	<i>Coordinator and Planner</i>	<i>share and revive industry culture using EE across different demographics</i>	<i>Practical</i>
A	Director	<i>Coordinator and Planner, Communications and Personnel Manager</i>	<i>Teach and engage local/elderly residents in environmental issues and protection, create a community network</i>	<i>Other – volunteering</i>
B	Education Specialist	<i>Program convenor, Communications, Promotion</i>	<i>Understand local history and culture, learn prehistoric technology and harmonious living with nature</i>	<i>Practical</i>
D	Professor and CEO	<i>Personnel Trainer, Consultant for EE venue and staff certification</i>	<i>preserve national heritage, assist in certification, and amplify impact of EE</i>	<i>Course</i>

Participants occupied positions with varying degrees of influence within their entity and held distinct roles in their respective programs. Programs goals either directly related to the delivery of EE (Participants A, B, D), utilised EE to fulfil core organisational goals for industry (Participant E) or aimed to satisfy the TEEA's requirements (Participant C). Based on Lee, Lee and Popuri's (2020) classification of program types, the proposed

scenarios included one course, two practicals and two volunteering programs (classified as “other”).

Three participants mentioned receiving funding from governmental sources related to the TEEA, two directly (Participants A and D) and one indirectly to cover transport expenses for school visits (Participant E). Although Participant A’s proposed scenario does not induce operational costs, they mentioned receiving financial support for other initiatives (Participant A at 00:25:29). Participant B mentioned they deliberately do not apply for the funding available due to the low amount offered in relation to the associated workload, instead funding programs internally. Similarly, Participant E said their entity also self-funded programs, but this was because they had failed to secure funding several times, potentially due to their status as a governmental organisation. Although it is assumed that all programs require a degree of manpower and administration, these costs were specifically highlighted by two participants.

Participants were then asked what support from the TEEA and its governing authorities was received and desired (Table 8). Two participants mentioned they received funding or program case referral, whereas three participants (Participant B, C, E) stated they received no direct support.

Table 8 – Current Scenario Program: Stated Received and Desired TEEA Support

Program	Response
Received TEEA Support	<i>Variable annual funding from EPA and MOE, a supplementary portion of funding, program case referrals</i>
	<i>None (3)</i>
Desired TEEA Support	<i>Funding for operation costs, Funding not dependent on cases, higher amounts of funding, Publicity and promotion to schools, Greater flexibility on accepted formats of EE, Measures to address external outsourcing for programs, policy clarification and reform</i>

The desired TEEA support related to funding, publicity, and policy. Two participants expressed a need for greater amounts of funding and flexibility regarding how it was used. One participant wished for assistance in the promotion and marketing of programs to EE targets and another three participants mentioned policy amendments. Policy amendments included removing restrictive clauses on what EE formats are accepted, further clarification of regulations, and implementing protections to regulate competition and opportunistic behaviour from external organisations.

5.2 Current Scenario: Outcomes

The stated advantages and costs revealed the perceived benefits and demands of a chosen program (Table 8). Advantages were largely unique to each entity, ranging in operational scale from individuals to servicing the community, region, or country. Costs, however, may be organised into financial and administrative requirements.

Table 9 – Current Scenario Program: Advantages and Costs

⦿	Advantages	Costs
A	<i>Drives economic development, receives media coverage for the village, foster positive relations with the environment</i>	<i>None – program is self-sufficient</i>
C	<i>Cultivate knowledge and practice simultaneously</i>	<i>Administrative responsibilities: reduced time for other activities (targets), reduced capacity for other tasks (personnel) Internal expenses</i>
B	<i>Provides a fun and novel experience</i>	<i>Funding – private</i>
D	<i>Expand reach to elementary and secondary children in a remote location, promote responsible tourism</i>	<i>Funding – partially from TEEA, partially from other governmental departments</i>
E	<i>Shared experience for parents and children, preserves cultural heritage</i>	<i>Administrative responsibilities: reduced capacity for other tasks (personnel) Internal expenses</i>

The outcomes of all program scenarios are presented by participant and claim type: measurable, tangible, intangible and unrealised (Table 10). In instances where no claims were made for a type category, “N/A” will be shown.

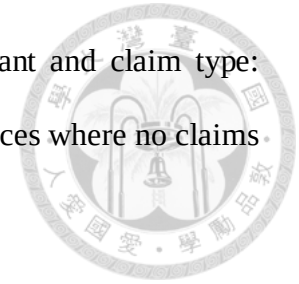


Table 10 – Current Scenario Program: Outcome Claims by Type

	Measurable	Tangible	Intangible	Unrealised
A	Increased participation numbers	Creation of a local culture Heightened ecological awareness Less marine waste	Elderly mental being and quality of life is improved	Young people underrepresented in target demographics
B	Increased repeat visits	Positive survey feedback Cognitive change in targets	N/A	Children's background knowledge is underestimated in content design
C	N/A	Proactive engagement in tasks More effective mobilisation of resources Personnel expertise enhanced	N/A	N/A
D	Increased number of certified venues Increased number of certified personnel	Growing social network of personnel Increased collaboration between EE entities Cognitive change in civil servants	Positive reputation for organisation and EE More individuals applying for EE-related degree programs EE-trained unemployed labourers and entrepreneurs	Lack of willing participants
E	Increased participation numbers Increased number	Positive verbal feedback from onsite visitors Industry culture	N/A	Duration and capacity of program was less than desired

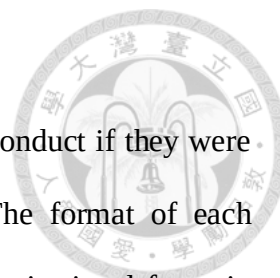
<i>of participating schools</i>	<i>revival Greater engagement with EE from adults</i>
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Measurable claims related to participation and certification at the level of individuals, schools, and entities. Tangible claims were related to greater awareness and knowledge, as well as more positive attitudes and values towards environmental issues as stated by all participants. Behavioural changes were also mentioned in several responses (Participants A, C, E).

Intangible claims not necessarily aligned with the program goals were identified in responses by Participant A and Participant D. Participant A stated that their volunteering program had the unexpected influence on elderly wellbeing. They noted that volunteers were willing to wake up at early hours of the morning and despite unfavourable weather conditions, attend their volunteering shifts. As a result, they “find another meaning in life” (Participant A at 00:13:14). Participant D similarly noted by engaging with diverse EE targets, they inadvertently influenced unemployed workers, entrepreneurs and individuals who decided to conduct EE research through higher education. Participant D further mentioned examples of those he influenced who later went on to establish their own conservation projects or sustainable businesses.

Unrealised claims related to EE targets, program content and program scale. These claims indicate concerns that programs do not reach a broad, extensive or intended audience to a sufficient degree, and did not deliver EE in the most effective way. Participant C found it difficult to offer any unmet task goals, rather stating they would rely on participant survey feedback to identify areas of improvement.



5.4 Envisioned Scenario: Potential

Participants were invited to describe a program they would like to conduct if they were leading the project and there were no restrictions (Table 11). The format of each program was largely unique to each participant's expertise and organisational focus in EE. Unmet needs ranged from logistical constraints such as insufficient equipment (Participant B) to a lack of support from EE targets, and organisational or governmental superiors (Participants A, D, E). Notably, Participant C stated that their ideal program was feasible, but inhibited by the TEEA's prioritisation of formal lesson plans and measurable outcomes. The solutions to other unmet needs included internal procedures such as location scouting or community consultation, or external such as engagement with religious organisations or different EE targets, and policy reform. Two participants could not provide any ways to address their unmet needs.

Table 11 – Envisioned Scenario Program: Format, Challenges and Solutions

Ⓐ	Format	Unmet Needs	Ways to Address
A	<i>Village-wide arts and cultural festival</i>	<i>lack of support from local government no communication infrastructure</i>	<i>None</i>
B	<i>One-day immersive wilderness experience</i>	<i>safeguards for participant wellbeing, insufficient equipment, unsuitable location, no communication infrastructure</i>	<i>Community consultation and participation, location scouting build new venue infrastructure</i>
C	<i>Unstructured guided interpretive tours or experiences</i>	<i>None</i>	<i>Policy reform – TEEA to not require formal lesson plans and teaching aids</i>
D	<i>Personnel training in underrepresented types of EE via multi-day retreat</i>	<i>Lack of willing participants, lack of diversity in participants</i>	<i>Emphasise EE for adults and religious groups</i>
E	<i>Beneficial insects' special exhibition</i>	<i>Limited manpower, lack of support from supervisors</i>	<i>None</i>

5.3 Critical Factors: Present

Participants were invited to reflect on their current scenario and discuss the relevance and importance of critical factors to the future of EE. The critical factors proposed aligned with six sectors: the economy, environment, culture, demography, governance, and technology.

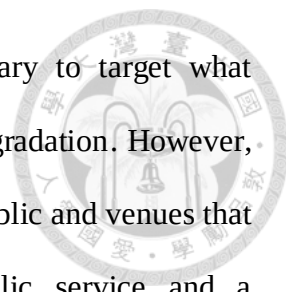
5.31 Economy

Economic factors were considered relevant by 4 out of 5 participants. Most concerns were related to the internal organisational system including the financial cost of EE to both personnel and the public, insufficient funding and limited budgets to establish and maintain programs, and competition with external organisations across corporate, industrial and EE consultancy firms.

The importance of collaborating with industry to conduct EE was mentioned by three participants (Participant A, D and E). Participant B stated they do not believe the economy is relevant to the future of environmental education “because it is only an inspiration in the public's thinking” (Participant B at 00:39:58). In other words, EE is not a force that actively participates in or influences the economy. Citing conflicting interests in profit and conservation, as well as competition for resources, the other participants were hopeful an integrated approach such as a circular economy could satisfy a range of stakeholders and highlight how environmental protection is a vested interest for businesses.

01:23:59 [Participant D]

Agribusinesses know that if I don't save energy and carbon, if I don't save energy, if I don't do a circular economy, if I don't do zero carbon emissions, my business won't survive. This makes enterprises willing to do this thing.



Incorporating EE into industrial enterprises was deemed necessary to target what participants believed to be the primary sources of environmental degradation. However, Participant D highlighted how the cost of EE often falls upon the public and venues that deliver EE due to its contradictory framing as both as public service and a leisure/tourism activity. Where EE is perceived as a public service, targets may be less willing to pay fees for programs. On the other hand, if EE is perceived as a leisure or tourism activity then targets may be willing to pay but will be limited by their financial situation. This reality makes the pricing of program fees a crucial consideration.

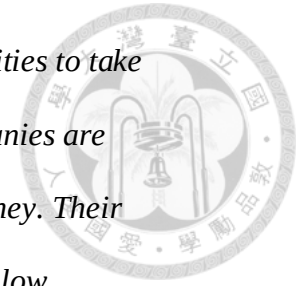
00:37:58 [Participant E]

They're not willing to spend money, and they think that's probably all you're worth. I think the economic factors are not too bad, but our fees will have an impact on whether or not they want to come, whether or not they want to spend money. Let's make it clear. I'm talking about two different things; whether they want to come with a lower fee and whether they have to spend any money. It's two different things.

Economic hardship also was suggested to discourage target participation and further constrain budgets for personnel, driving them to operate EE like a business operation. Lower budgets also meant that programs could fall below a desired standard of quality, causing dissatisfaction among targets who paid to take part. Four participants (A, C, D, E) discussed the phenomena of program outsourcing, where external consultancy organisations are commissioned to conduct programs on behalf of venues. As the TEEA mobilises a determined amount of funding each year, Participant D commented on how an external organisation may travel across the country in search of cases.

00:41:36 [Participant D]

They make their money by going to counties and municipalities to take on a lot of environmental education projects...These companies are somewhat profitable, and the bosses make a little bit of money. Their employees work very hard and their salaries are very, very low.



As they specialise in writing proposals, Participant A further claimed they were applying for funding based on their conservation projects and decades of EE work their organisation had conducted in the region.

00:41:27 [Participant A]

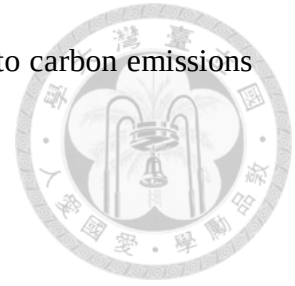
..... Of course, they are not environmentalists and have nothing to do with environmental protection. They are probably not going to talk about small projects either. They will always talk about big plans, maybe millions or tens of millions of dollar plans.

The prioritisation of large-scale cases was also mentioned by Participant D. Smaller organisations may not have the expertise, resources or infrastructure to write proposals, conduct research and collect statistics on their programs, affecting their chances of being granted funding.

5.32 Environment

Environmental change and the severity of environmental issues was mentioned by all participants. These issues included climate change, marine waste, food and water scarcity, energy production, natural disasters, mass extinction, global warming, air pollution and land degradation. The historical origins of EE in industrial pollution and energy consumption were also mentioned by Participant D, who suggested the future of

EE be informed by its past and remain focused on actions relating to carbon emissions and energy usage.



01:00:41 [Participant D]

Basically, it should be integrated with climate change to tell people to save energy and reduce carbon emissions, which is a very, very important thing. This is also the purpose of doing this in the first place. It should be like this.

As environmental issues change and develop, Participant D stated materials and statistics quickly became out of date. Therefore, combining environmental research and action reaffirmed the importance of centring ecological concepts as a basis of EE. Participant B shared this sentiment, stating observable changes in the environment were crucial in communicating the urgency of EE and its relevance to individuals' lives.

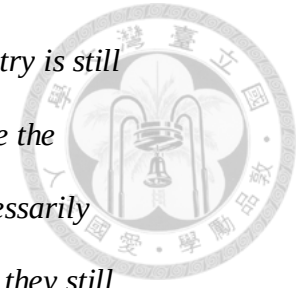
00:24:54 [Participant B]

...I personally think that the environment is a very important indicator that enables the public to feel the changes in the environment most directly in their lives. For example, the deterioration of air quality and the increase in temperature are things that the public can feel intuitively. I think it is important.

Although the public's awareness and sensitivity of environmental issues remains a key issue, Participant E believed that the targets of policy interventions may be neglecting the corporate sector. These misplaced efforts contributed to a feeling of helplessness that their impact would not outweigh the disproportionate influence of industry.

00:42:10 [Participant E]

I think that the target of the environmental protection industry is still mainly the general public. In fact, those who will jeopardise the environment are the business groups, but they may not necessarily accept the environment or after accepting the environment, they still insist on destroying this environment. I think that sometimes we feel very helpless in promoting the environment, because there is not much you can do to change it. We are only promoting some visible and practical actions.



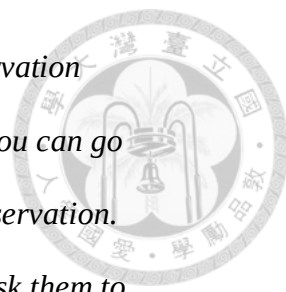
Similarly, Participant A expressed fear that the implementation of EE is too late to achieve the required change and impact necessary to stop environmental destruction. Regional development was resulting in environmental changes such as reduced water quality and declining species populations which was one of their key conservation actions in addition to EE programs.

5.33 Culture

Culture was identified as an important factor to the future of EE by all participants, with a particular emphasis on the issues of cultural preservation, place identity and cultural norms around pro-environmental behaviour.

Culture was noted to not be fully represented or integrated into EE, due to difficulties in passing certification for venues and a lack of personnel with expertise in the area. Participant D explained how most EE personnel had backgrounds in environmental science, ecology and conservation, resulting in their established facilities to promote those fields.

00:53:24 [Participant D]



In the eight major fields, I think there are no cultural preservation organisations that are teaching. I don't have a survey, but you can go up there and see that 80%, 90% of them are ecological conservation. So if we train people to do ecological conservation, if you ask them to do cultural preservation, they won't do it. But why doesn't anyone do cultural preservation? It is because even after you offer a course, not many people want to learn it.

The lack of representation in cultural EE did not negate the importance of preserving cultural heritage. For Participant C, programs that aimed to explore human dimensions partnered with indigenous communities in the area. However, due to landscape degradation and infrastructure development, populations were leaving and thus their staffing was being affected. Local culture was fundamental to the program of Participant A, who suggest that with internationalization, protecting place identity was increasing important. Similarly, regional changes such as the decline in agriculture and industrialization of the local area were believed by Participant E to be changing the subjective norms of environmental protection.

00:44:10 [Participant E]

...It is the difference between having a culture or not. Some of our old farmers, they are cultured from the past. Their father and mother told them our fields cannot be deserted, you have to know how to maintain it well, know how to try not to destroy it. This is a cultural heritage, but our current generation is full of people do not have the concept of agricultural culture...Its culture is a core, if you don't have this kind of thinking, you will keep on destroying the environment.

The loss of pro-environmental attitudes was also mentioned by Participant B, who suggested modern lifestyles were incompatible with sustainable living. By educating targets on how pre-historic peoples lived in harmony with nature, not out of altruism but out of necessity, the participant hoped audiences would realise sustainability is possible with the knowledge and technology humanity possesses.

00:25:36 [Participant B]

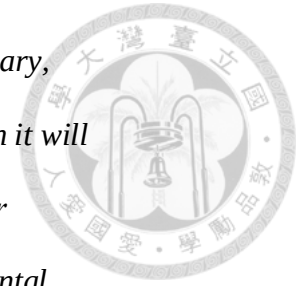
...our subsequent conclusion is that it is clear that they [our ancestors] did not really do this for the sake of environmental protection because the technology or materials available to them at that time were limited. But it also makes us reflect on the idea that we could survive on this earth for thousands of years without destroying the environment. But we modern people can destroy the environment in just a few years.

5.34 Demography

Demography was stated to be an important factor by four out of five participants. Participant B stated EE will always be necessary for all age groups and backgrounds, therefore stating they did not believe it would influence the future of EE. Other participants, however, mentioned issues of demographic changes to personnel and targets. A declining population of children was mentioned by three participants (C, D, E). The primary targets of the TEEA, the decline in children is associated with the closure of schools and smaller attendees for programs.

00:55:21 [Participant D]

Well, fewer children will lead to the collapse of the elementary, middle, high school, and university levels. If it crashes, then it will become said that your schools at all levels... With a smaller population, there will be fewer people who need environmental education.



Considering this population trend, Participants D and E discussed an aging population. Older age groups have not been prioritised by EE, representing a potential area for expansion as noted by Participant D and realised by Participant A's program. Participant E further explained the value in delivering EE to adults who have more authority and influence in environmental protection.

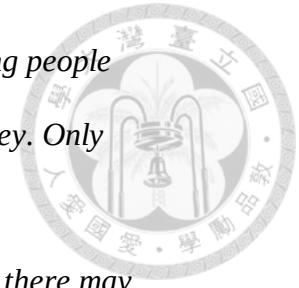
00:42:40 [Participant E]

You will find that children have a sense of justice, and that they do not want a factory and do not want to develop it indiscriminately. What about the adults? No. It is the adults who need to be taught the most. Children are very pure. But it is the adults who are always destroying the environment, because they are the ones who have taken the medicine and know that they have to be good to the environment, but in reality, they only destroy the environment for their own interests.

Demographic changes in personnel were also mentioned, as current workforces age and the need to recruit new staff arises. Participant A and Participant C mentioned the issue of generational handover within their organisations, however EE was stated to be a challenging career for young people to enter.

01:13:10 [Participant D]

Generally speaking, it is impossible for young people. Young people have to go up the ladder, go to school, work and make money. Only when they reach a certain age will they want to do this [environmental education]. But usually after a certain age, there may be some health problems, some conditions, so it's not easy.



5.35 Governance

Governance was stated to be an important factor by all participants with distinctions made between internal organizational governance and external national governance.

Political parties and the vulnerability of policy to change was noted by two participants. Participant D expressed concern that national environmental policies would have a bearing on how EE is perceived and conducted. Furthermore, Participant A discussed challenges in collaborating with changing government units. As their entity has been operating for over two decades, communicating the legacy of their work and avoiding party politics was a challenge.

00:29:13 [Participant A]

I really feel as if I have given birth to a child, and so it goes. The kind of feeling I am talking about now makes me want to cry, it is like you have given birth to a child, then the government can be on site and pay no attention to it. The authorities only see a vote, and that's it.

The insecurity of EE was also found within internal organisational contexts. Participant B and E both conducted EE as a supplementary task to their workload and expressed vulnerability to the decisions of authority figures on both the existence and direction of programs.

00:50:10 [Participant E]

Here's the part where we say that environmental education for us is a task programme. Do you understand what is meant by task organisation? It's a very temporary organisation that can be disbanded with a mission at any time.



How EE was defined by the TEEA again has implications for the willingness of both participants' entities to conduct EE. As agricultural education was not included in the TEEA's parameters of EE, Participant E's entity was said to be considering rejecting their certification as an EE venue. The influence of policy on the direction of EE was also mentioned by Participant B, who stated that sometimes the government's promotion of specific issues was challenging to incorporate into their programs.

00:28:34 [Participant B]

For example, they have actually launched a so-called net-zero carbon emission component in the last few moments, and in fact, this component has been rolled out to various venues...It's just that the familiarity of each field in this matter or the state in which they can operate may be different.

In addition to policies related to net zero carbon emissions, the prevalence of ESG was highlighted by Participant D. The field of environmental education was claimed to be a saviour to corporations who need to find a way to demonstrate their commitment to sustainability and environmental issues. However, Participant D forewarned that the government may be subsidising a superficial engagement with EE which reasserts the need for venues to provide accommodation and amenities.

01:02:28 [Participant D]

They will come to the venues of environmental education facilities and then take a stroll. What happens after they have taken a stroll and a walk? They can then go to the next stop to eat a big meal and sleep in a nice hotel. They have also completed the task of environmental education as explained by their superiors, but it is also because of this that our environmental education organisations have a venue and a need to exist.



5.36 Technology

Technology was stated to be an important factor by all participants who emphasised its potential in supporting the promotion, publicity, and delivery of EE, as well as environmental protection.

The speed and ease of sharing information were highlighted by four out of five participants. Participant C and D shared how they were able to efficiently coordinate personnel and resources using social media groups, establishing a network within or between organisations.

01:05:49 [Participant D]

Through the influence of technology, we can quickly spread the knowledge of environmental education. In fact, during the pandemic, the Ministry of the Environment allowed environmental education programmes. Some of our courses were taught through online courses. So, there is an opportunity for environmental education to spread through online knowledge.

Technology was noted as fundamental to the continuation of EE throughout the COVID-19 pandemic, as it facilitated online EE training courses. Online platforms also assisted in the general promotion of EE and programs, as experienced by Participant B. Virtual technologies were mentioned by two participants (D, E), especially the use of AR and VR which can be controlled to offer new experiences for targets.

00:55:34 [Participant E]

...but I don't think this kind of interactive virtual experience can completely replace our profession of design. Because the physical experience is still warmer after all. Because it is determined we can follow the situation. For example, what kind of person is this, and I'm going to give you something different, something weird or how to guide you to the correct thing.

The limitations of technology were mentioned by Participants C and E. While optimistic about how new teaching aids could enhance EE delivery, they asserted that technology could not replace the human interaction that drives it. With regard to environmental protection, Participants A, D and E remained hopeful that technological advancements could alleviate environmental issues simultaneously.

5.4 Critical Factors: Future

Participants were invited to reflect on their envisioned scenario and answer questions relating to the future of EE for their entity and the sector in general.

The 3 Questions prompt asked participants generate three questions about the future they would like to receive the answers for. Table 12 below summarises each participant's questions and organises them by their associated sector. Several questions

did not align with any of Ratcliff's (2022) Six Sectors; therefore, in the place of a critical factor they are classified as "N/A".

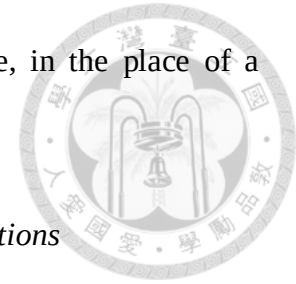


Table 12 – Envisioned Scenario Program: Responses for the 3 Questions

If you could pose 3 Qs about the future and receive an answer, what would you ask?	Factor
<i>When will humanity reach ecological collapse?</i> <i>What is the fate of humanity after ecological collapse?</i> <i>How many Celsius degrees will temperatures rise by 2100?</i> <i>What will be the condition of the environment by 2100?</i>	Environment
<i>Is it possible to solve environmental issues with technology?</i> <i>Is it possible to commodify and preserve natural systems with technology?</i>	Technology
<i>Will younger generations be able and willing to continue environmental action?</i>	Demography
<i>How can the government better promote EE and enhance public awareness?</i> <i>What does the government expect of EE personnel?</i>	Governance
<i>How feasible is it take our EE program into the field?</i> <i>What teaching materials are the most effective?</i> <i>What modes of interaction are the most effective in EE?</i> <i>How can we make targets more receptive to pro-environmental behaviour?</i> <i>Will we always need environmental education?</i>	N/A

The majority of questions communicated uncertainty about the future state of the environment (Participant A, C and D) and the praxis, impact and direction of EE delivery (Participant B, C and E). The potential of technology to support environmental protection and EE was mentioned by two participants. One participant was particularly concerned with the TEEA's development and use for EE promotion, but also expressed concern that personnel were not adequately trained in the pedagogical skills needed to deliver the knowledge gained through certification. Furthermore, one participant mentioned generational handover and whether the legacy of their organisation could continue.

Understanding what participants perceive as important lessons for the future reveals key observations and conclusions about effective EE delivery (Table 13). Responses to these questions aligned with the literature surrounding EE, highlighting the importance of issue awareness, self-reflection, meaningful engagement, and active participation.

Table 13 – Envisioned Scenario Program: Responses for Good Lessons

What important events from the past few years provide good lessons for the future?	
A	<i>Reflection is important for EE personnel and EE targets. (2)</i>
B	<i>Providing alternative perspectives on environmental issues is effective.</i>
C	<i>Active participation in addressing current issues can build intrinsic motivation.</i>
D	<i>Generational differences are affecting how people interact with nature and society.</i>
E	<i>EE targets that experience an emotional reaction are more likely to recommend programs.</i>

Notably, Participant D echoed the growing disconnection between young people and the environment due to technology causing less community engagement, and their role in coordinating groups of students to volunteer in remote locations.

When asked what major decisions their respective organisations were facing in relation to the future of EE, four out of five participants offered responses unique to their professional capacity and role (Table 14). Whereas some decisions related to Environment and Economic sectors such as circular economy and industry regulations, others related to governance both internal and external to the organisation. Participant C said their organisation was considering whether to outsource the delivery of EE to an external organisation, but expressed concern this would concede a degree of control over the direction of EE delivery. On the other hand, Participant E expressed concern that departmental restructuring could cease or reduce their current delivery of EE.

Table 14 – Envisioned Scenario Program: Interview Responses for Major Decisions

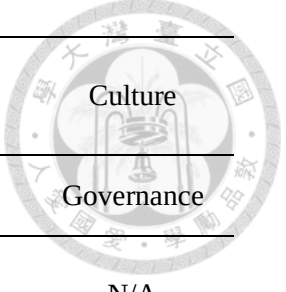
What major decisions with long-term implications are you currently dealing with?		Factor
A	<i>Whether or not to promote the industrial use of ecosystems and invest in circular economy.</i>	Environment, Technology, Economy
B	<i>None</i>	N/A
C	<i>Whether or not to outsource EE programs to an external organisation.</i>	Governance
D	<i>How to establish an effective carbon emissions evaluation system and EE training for industry professionals.</i>	Environment, Economy
E	<i>Organisation departments could be merged and disbanded, need to decide how EE is prioritised.</i>	Governance

Participants were asked to contemplate their hopes and fears for the future of EE by within the scenario of a “best world” and “worst world” (Table 15).

Under the best conditions for EE, three participants referred to the critical factors of *Culture* and *Technology*, and their potential to further environmental protection. Alternatively, two participants offered responses that related to governance and the TEEA directly. One participant wished for the TEEA to be more inclusive of outdoor or experimental education pedagogies such as interpretation and another wished that EE be fully integrated into formal education where teachers can assist in the evaluation of EE programs by providing long-term feedback on their students’ environmental dimensions.

Table 15 – Envisioned Scenario Program: Responses for “Best” and “Worst” World

Scenario	Response	Factor
Best World	<i>Greater awareness and action towards the mitigation of climate change</i>	Culture
	<i>Circular economy is commonplace</i>	Technology
	<i>Greater innovation in environmental action and technology</i>	
	<i>TEEA to be inclusive and compatible with interpretation EE is fully integrated into formal education</i>	Governance
Worst	<i>Environmental degradation reaches an irreversible state (2)</i>	Environment

World	<i>Cultural heritage disappears and is lost</i>	 Culture Governance N/A
	<i>The public become inactive and apathetic to environmental issues (2)</i>	
	<i>Policy changes and the removal of the 2050 Net Zero Carbon Emissions target</i>	
	<i>The amount of effort and resources put towards EE is not correlative to its impact</i>	
	<i>EE becomes performative and a leisure/tourism activity</i>	

Under the worst conditions for EE, three participants mentioned *Culture*, specifically the loss or change of cultural heritage and cultural norms around pro-environmental behaviour. Two participants mentioned the *Environment*, fearing that environmental catastrophe is inevitable and it will be too late to act. Participant D notably cited political instability as a concern for the future of EE, suggesting policies are vulnerable to alteration or dissolution with changing administrations.

One participant suggested that the worst-case scenario was “exactly what’s happening now” (Participant C at 46:22). This was due to the increased amount of manpower and funding directed into fulfilling the TEEA and the limited returns on this investment. This echoed the response of Participant E who suggested EE prioritised statistics and award recognition over its intended impact by its regulating body. Like Participant D, they were worried EE is perceived as a leisure activity by its targets “the public will feel that ‘I often go to these environmental exchange activities, and it’s all the same. Every year, we just go to have fun, eat and drink” (Participant E at 01:33:13).

Chapter 6: Discussion

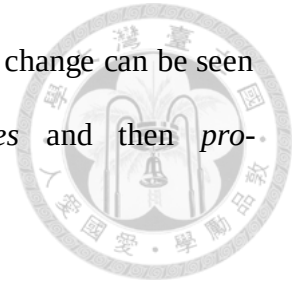
Findings are arranged under common themes and discussed in accordance with the research questions and literature. Following each section, a summary will outline key considerations for the TEEA's development.

6.1 Outcomes vs. Potential (Research Question 1)

To assess the impact of the TEEA, the parameters of its performance are defined by its “outcomes” and “potential” in inspiring public behavioural change. Outcomes will be explored in terms of what was achieved through statistically significant changes in survey data, law amendments and the stated claims of current programs. On the other hand, the potential will be explored in terms of what could be achieved through unrealised claims, received and desired TEEA support and the envisioned programs. Together, the comparison of outcomes and potential will answer whether environmental education policy was a sufficient and effective intervention between 2011 and 2020 in aiding pro-environmental behaviour.

For outcomes, analysis of national survey data shows that a statistically significant change was present for only 9 of the selected 18 variables of which the degree of change was considered small (<0.5). These findings suggest that the TEEA has had a small or negligible influence on most variables, further supported by the limited distribution spread for both survey years. However, it should be noted that the capacity for change within the three selected dimensions cannot solely be determined from the 2010 baseline data. If public agreeableness to pro-environmental behaviour was already relatively high, then the difference between the datasets is expected to be marginal. Although outwith the scope of this study, further cross-country comparisons could provide a more secure baseline with which to measure relative change.

Of the variables where a significant change was present, the biggest change can be seen in *environmental values*, followed by *environmental attitudes* and then *pro-environmental behaviour*.



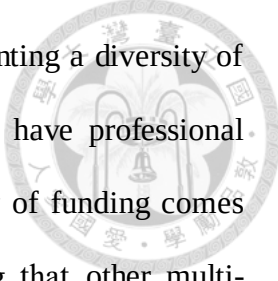
The notable difference between the dimensions of attitudes, values and behaviours is useful for identifying which stage the intention for pro-environmental behaviour is realised or inhibited. Data for *environmental attitudes* showed lower degrees of concern about the environment, contrasted by greater belief in the value of individual action despite perceived low levels of collective action. The negative change in degrees of concern but positive change in the perception of individual action could be evidence that a more personal engagement with environmental issues is missing from EE. However, a large majority still felt their individual efforts were undermined by collective inaction and low subjective norms, which aligns with low instances of environmental group membership, protesting, donations, or green purchasing. For *pro-environmental behaviour*, the two significant changes of increased recycling and petition-signing are both individual actions that either have the economic incentive of utilising government waste management or are non-committal, less demonstrative and at no cost.

Data for *environmental values* shows that the public is overall less willing to pay higher prices to protect the environment, but more willing to cut their standard of living in 2020. These results reveal that economic security is a higher priority than social wellbeing when evaluated against the environment despite greater support for environmental protection. Similarly, more individuals were concerned about human progress damaging the environment, but a greater proportion also believed we worry too much about the environment and not enough about prices and jobs. Together, these findings indicate that although public has improved issue awareness and understanding

of human-nature relations, they may struggle to prioritise issues amidst ongoing social issues. This conclusion is supported by a two-times increase in the number of invalid responses, of which the highest proportion of invalid responses came from *environmental values*. It is possible that the 2017 amendments to the TEEA to reduce passive learning activities in favour of outdoor and experiential education may not be able to as effectively teach the critical thinking skills required for everyday decision-making and environmental action.

The outcomes of EE certified organisations vary in the scale, depth and kind of impact achieved. Measurable claims included increased participation and certification in EE which, as the TEEA mandates targets to attend and requires organisations to track the number of visits, this finding is expected. For intangible claims relating to the public, interview participants highlighted knowledge and awareness, among improved subjective norms within their immediate communities regarding pro-environmental behaviour. Based on survey data which shows a vast majority of the public do not believe pro-environmental behaviours are too difficult for them to implement, low subjective norms may be the main contributing factor to inaction. The unexpected interest by elderly, retired and unemployed demographic groups proves financial or professional commitments influence the degree of spontaneous participation and may exclude specific proportions of the population more than others.

Evaluating the unrealised ambition of organisations can provide valuable insight into their potential for growth should the appropriate resources and barriers be addressed. The unrealised claims of programs included difficulties in executing a program to a desired scale and promoting or tailoring to a specific target audience. A lack of willing participants for specialised types of EE was also noted, becoming the focus of an

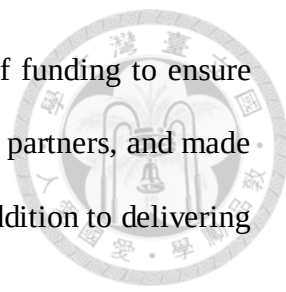


envisioned program. These findings signify the challenge of representing a diversity of topics to a diversity of targets. As a vast proportion of personnel have professional backgrounds in ecology and conservation science, and the majority of funding comes from the EPA's Environmental Protection Fund, it is unsurprising that other multi-disciplinary topics with cultural or human dimensions are not fully integrated or incorporated into the practice of EE. However, this omission creates a conceptual distance between the relevance of ecological knowledge to modern and urban living, which three of the envisioned programs aimed to address by representing harmonious relationships between humans and ecosystems.

The unmet needs for envisioned programs largely related to insufficient support from executive leadership and manpower within governmental organisations and inadequate communication, resources or collaboration for non-governmental organisations. Two personnel struggled to offer solutions to overcome these barriers, and another stated the TEEA was the sole barrier to their work, which implies these individuals feel a sense of powerlessness to their circumstances. The refusal of funding by three organisations in favour of a reduced workload suggests that alternative forms of support, specifically promotion and communication assistance, are more necessary.

6.11 Enhancing Program Performance

Organisations with high outcomes and high potential were both able to execute programs that met their goals to a desired impact and had ambitions for programs that were achievable under the current system of the TEEA. The characteristics denoting the four classes of high outcomes, low outcomes, high potential and low potential are described as follows:

- 
- Organisations with *high outcomes* utilised diverse sources of funding to ensure financial security, collaborated with community and industry partners, and made the greatest contributions to the subjective norms of EE in addition to delivering EE to their targets
 - Organisations with *low outcomes* refused funding and cases mobilised by the TEEA, suffered from high administrative burdens and were isolated from intergovernmental collaborative networks
 - Organisations with *high potential* were inhibited by operational constraints such as infrastructure, the modifying of content for their programs, and the promotion of their programs to specific audiences
 - Organisations with *low potential* were inhibited by a lack of support from internal or external governance, funding accompanied with strict regulations for its use, and the manipulation of EE for award recognition or political influence

In short, EE policy was an effective measure in improving environmental awareness, attitudes and skills of the general public, otherwise known as the precursors of behavioural change, but was limited in generating pro-environmental behaviour between 2011 and 2020. With this understanding, this study recommends that interventions aim to increase the performance of entities with low outcomes and address the obstacles of entities with low potential to increase the performance and impact of programs. Future programs should also focus on diversifying their topics and target audience, addressing collective action and issue prioritisation with a culturally informed approach.

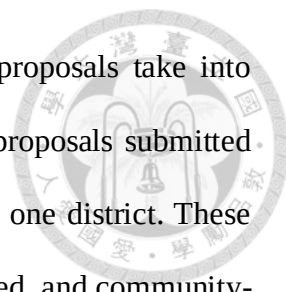
6.2 TEEA Development and Reform (Research Question 2)

Although the TEEA claims to support and enhance the delivery of EE, research findings indicate there are discrepancies between the policy on paper and in practice. Funding is one of the core provisions of the TEEA and was the only stated support received by two personnel, while three personnel said they received no support.

6.2.1 Incentives, Mandates and Resources

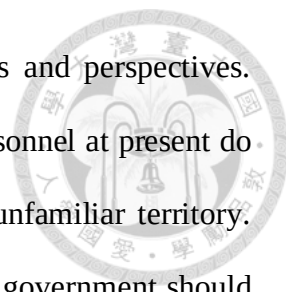
The allocation of funding is a significant policy instrument used to ensure, encourage, and support law compliance. By financially supporting entities with far-reaching and broad goals, the positive impact of environmental protection and EE in the community is amplified. However, the amount available each year remains variable. This short-term funding not only prevents long-term projects but requires venues to expend resources and effort to continuously adapt their programs, stretch their budgets or boost their for-profit operations to meet the law's requirements. Payments into this Environmental Protection Fund are optional, as violators have the choice to either accept the fine or participate in EE courses. With a constrained fund but an increasing number of certified entities over the past decade, funding under the present system is concurrently a resource and burden for EE entities to acquire, manage and justify.

Limited resources foster competition which, when regulated, is a healthy component of a system. It rewards high-quality proposals and encourages organisations to innovate. However, as several participants have suggested, a lack of consideration for the applicant's background as much as their proposal has led to opportunistic external companies outcompeting local and established EE venues for cases and funding. Personnel lacking in specific skills for proposal writing may be less able to present their plans in a convincing way, despite the potential, feasibility and ambition of their



envisioned programs. Therefore, the study suggests that funding proposals take into account the applicant facility's background, the number of active proposals submitted by one facility per year, and the number of proposals submitted by one district. These considerations can ensure that longstanding programs can be sustained, and community-based organisations can retain equal opportunities to apply for funding. As all interview participants stated, the most important lessons they have learned through their programs are related to EE pedagogy which means a venue's experience is a crucial indicator of their potential. Alternatively, providing skills training and guidance on proposal writing during the certification process could help personnel better advocate for their ideas. Even though external EE consultants and companies can play a significant role in managing municipal and national-level projects, the inclusion of local or smaller venues prevents funding monopolisation and develops a diverse ecosystem of EE venues. This aligns with two participants' desire for policy measures to address the allocation of funding and outsourcing of programs.

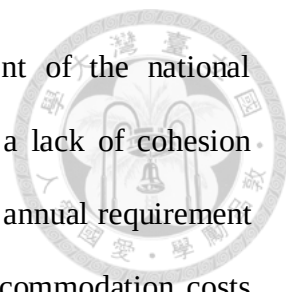
A key challenge in the enhancement of EE related not only to the network of venues but the number and qualifications of personnel. Certification for venues, facilities and personnel has shown substantial growth over the past decade and in conjunction with the 2022 law amendment decreasing the number of required training hours from 120 to 100, the TEEA has successfully contributed to the sum of qualified practitioners in EE. However, interview results have revealed that despite being certified some personnel struggle due to low salaries and a lack of pedagogical training. Effective pedagogy in EE was a key focus of questions even by personnel with years to decades of experience, putting entry-level personnel without experience at a disadvantage. A lack of willing and diverse participants in EE harms not only the sustainability of programs or venues



with personnel nearing retirement but robs the field of new ideas and perspectives. Specifically for highly specialised forms like cultural EE, many personnel at present do not have the expertise or incentive to develop their practice into unfamiliar territory. Therefore, new talent should be incubated at an early stage and the government should assist in the direct promotion of these topics to EE target groups like school students. Likewise, highly specialised activities such as interpretation are not included on the TEEA's pre-determined list and will be excluded from financing. Venues desire control over their programs and should not compromise other social or conservation commitments, a more inclusive yet flexible approach to informal EE could remedy the refusal of resources and an inordinate amount of work.

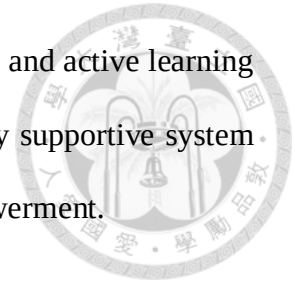
6.22 Formal, Non-Formal and Informal EE

The undefined distinction between formal, non-formal and informal types of EE is associated with contradictions in the TEEA's regulation and practice. As forewarned by Hsu in 2017, the practice of informal EE remains at odds with funding allocation and program evaluations which prioritise structured lesson plans and measurable outcomes. Informal education is essential to establishing subjective norms and a conducive setting for pro-environmental behaviour but in the experience of one interview participant, the TEEA has distanced EE delivery further from spontaneous learning experiences in nature. Likewise, the envisioned program of another participant involved an informal wilderness experience, but they feared their proposal would be difficult to justify from a safety and logistical perspective. It was suggested these experiences were not only effective but more important now than ever due to the inaccessibility of natural spaces for urban residents as echoed by Pyle's extinction of experience. Interestingly, the TEEA's reform in 2022 to de-emphasise formal education in favour of non-formal education opposes the wishes of two interview participants for EE to be further



integrated into formal education. At present, EE is a component of the national curriculum for grades 1-12, yet these frustrations may stem from a lack of cohesion between formal and non-formal educators in fulfilling the four-hour annual requirement for schoolchildren. For teachers, they must tackle transport and accommodation costs which can discourage visits to more remote locations or trips of a longer duration if additional subsidies or assistance is not given. For venues, the TEEA mandates they treat EE as an informal education with structured learning objectives and focus on practical skills. However, it was noted by one interview participant that they had underestimated the breadth and depth of knowledge EE targets held due to content crossover. While the national curriculum abstract is available to personnel, the TEEA advisory board should coordinate and guide venues to build upon the foundational knowledge established in schools and improve communications between and across formal and informal EE. Another point of contention lies in the perception of EE as non-formal education but its regulation as a formal education practice with very structured lesson plans and timed activities. Due to the time constraint of four hours, venues may struggle to teach the necessary contextual information and issue awareness to their program before introducing more practical skills and critical thinking. As survey data confirms, the public exhibits more overall belief in the validity of environmental threats and a lower degree of extreme concern. This phenomenon indicates that there may be inconsistencies in how environmental information is utilised and discussed whether within EE or in the broader context of society. To combat this trend, EE entities should incorporate observation and/or investigation components into their curriculum to help targets to formulate evidence-based conclusions and beliefs that ultimately determine how issues and actions are organised by relative importance. The effectiveness of volunteering and certification training was also noted by three out of

five interview participants, suggesting that a combination of passive and active learning could not only amplify the impact of EE but also create a mutually supportive system based on contributions to conservation issues and community empowerment.

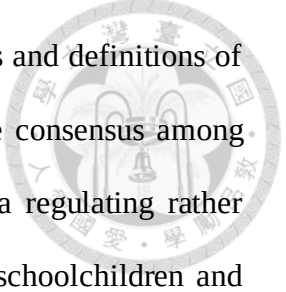


6.23 EE as a Public Service, Business, or Ideology

Due to the complex and multi-faceted purposes EE certified organisations have, the perception of EE as a public service, business and/or ideology has significant implications for how targets or personnel engage with its practice. When conducted as a public service, EE programs are a fundamental right to targets and thus the expectation is that participation is either subsidised or free. However, this expectation forces organisations to navigate a balance between making programs accessible but covering their operation and personnel costs. Where EE is not the primary task or goal of the organisation, justifying the financial and human resources required to sustain programs becomes a point of contention between lower and higher levels of personnel. When conducted as a business, EE becomes a social enterprise, a nexus of infrastructure and amenities in natural spaces to accommodate the leisure, tourism and edutainment of families and corporations. When conducted as an ideology, EE programs become a vessel for public engagement guided by the TEEA towards an ambitious yet uncertain vision of sustainability.

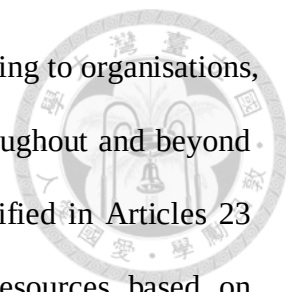
6.24 Policy Recommendations

The TEEA's regulations and provisions, as presented in *Table 1*, have a direct influence on entities and their programs. These articles will be referenced below to contextualise results as actionable amendments.



In Articles 1-4, the TEEA has clearly defined the aims, roles, targets and definitions of EE. Although the aims of the law and EE are well understood, the consensus among interview participants suggests that the TEEA serves primarily as a regulating rather than a supporting authority. Furthermore, the emphasis on EE for schoolchildren and governmental workers excludes a larger proportion of the population such as adults and the elderly, restricting its reach and perceived impact. Regulations over tertiary stakeholders could be developed further, as their participation remains optional and may lack meaningful depth. The ambiguity regarding how EE is defined in theory and practice – whether as a public service, business or ideology – has resulted in the inconsistent management of programs in terms of financial, administrative and accountability performance.

The national abstract, action plans and evaluation of programs as stipulated in Articles 5-7 has increased the coordination and collaboration of entities under nationally promoted environmental initiatives. However, in the case of program marketing and promotion, the TEEA could provide further assistance. While the evaluation of programs prioritises measurable outcomes such as participation numbers, it is possible evaluation could be managed across formal and non-formal institutions to provide long-term tracking of tangible and intangible outcomes relating to pro-environmental behaviour in schoolchildren. From the experiences of interview participants, programs that combine passive and active learning in real-life settings were most effective in engaging audiences. Therefore, the accepted formats of EE could be expanded to include volunteering and professional training related to environmental or industrial sectors.



In Articles 8-17, the TEEA has mandated a regular provision of funding to organisations, allowing them to conduct programs that extend their influence throughout and beyond their surrounding communities. However, the funding system specified in Articles 23 and 24 is unsustainable and may not appropriately distribute resources based on outcomes and potential. Therefore, it is advised that the central authorities revise the TEEA to address funding shortfall or make efforts to guide entities to establish more sustainable financial operations. Previous studies have also demonstrated a significant increase in certification rates for personnel, entities and facilities within the past two decades which has improved the expertise and documentation of EE practitioners. However, financial constraints and low salaries mean interventions to support professional development are necessary to ensure youth can continue the practice of EE. Moving forward, training should also emphasise the pedagogy of EE to address the inexperience of some personnel and widespread interest in what constitutes effective practice. Intergovernmental collaboration was mentioned to be largely self-organised, so further assistance to connect entities across scientific and artistic disciplines to enhance their delivery.

The incentivisation and rewards of participation, as outlined in Articles 18-22, were mentioned by interview participants in reference to private participation and rewards for performance. For corporations, superficial engagement and a reliance on the infrastructure treat EE as an activity of tourism and leisure. While this is an attractive feature for public engagement in EE, it does little to cause cognitive or behavioural change in the demographic and forces entities to prioritise amenities over meaningful teaching. Measures should be implemented to ensure that EE is not manipulated for political or media influence, and research should ensure entities have the most relevant

and up-to-date information for their programs. Incentives to involve religious organisations in order to diversify the types and applications of EE should also be implemented.



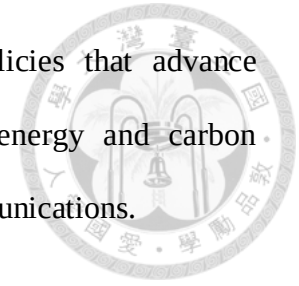
6.3 Considerations for Future EE (Research Question 3)

Through the lens of economic, cultural, environmental, demographic, governance, and technological critical factors this study has identified future points of consideration for stakeholders and policy targets.

6.31 Governance

Governance at all levels under EE policy is fundamental in regulating systems and ensuring compliance. Within their organisational entities, the aspirations of upper management for award recognition and media coverage may contend with personnel who are most burdened by the administrative and financial constraints set by their superiors. This resulted in one interview participant's organisation to be considering outsourcing their programs to reduce their workload. Similarly, district-level political figures external to the organisation have a vested interest in promoting EE to further their public image which extends the power imbalance of those with the resources and those dependent on them. The regulation of EE on a task basis furthers the insecurity of programs through organisation restructuring such as mergers or disbandment, as cited by one interview participant as a major decision affecting their organisation. Governance at the municipal or national level was suggested to be also influenced by political terms. As changing party representatives may not be familiar with the history of an EE entity and their relationship to the community, there were instances of dissent over the design of programs. The vulnerability of EE policy at the national level was also mentioned in reference to the safeguarding of environmental policies in general. To

establish EE as a necessary and important act, upholding policies that advance environmental protection and address pressing issues such as energy and carbon emissions is vital to prevent inconsistencies in environmental communications.

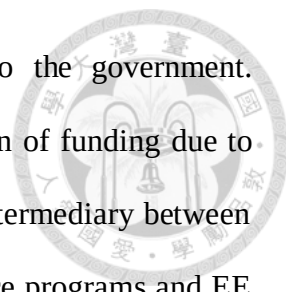


6.32 Demography

The sustainability of EE programs was also questioned through a demographic lens regarding targets and personnel. Despite the diversified interests of EE targets, the TEEA's four hour regulation for schoolchildren and government workers means that a vast proportion of programs are catered to children. However, with Taiwan facing a population decline, four interview participants mentioned an upcoming reduction in their target pool. It is noted that the current and envisioned program of three participants specifically targeted adult and elderly populations, audiences which were stated to be underrepresented in EE programs yet have significant influence on the degradation and protection of the environment. The broader framing of EE as a service for children makes EE appear as less relevant to older audiences, as confirmed by the overwhelmingly positive self-reporting of pro-environmental behaviour in the public (Q5). For personnel, ensuring that the influx of talent into the field of EE was a pressing concern as a high proportion of volunteers and individuals in the process of certification were either of late working age, elderly or retired. Attributed to the low average salaries afforded to young professionals in EE, this trend threatens the longevity of entities.

6.33 Economy

Financial priorities have notoriously been at odds with environmental protection, and for the context of EE the situation is no different. Economic hardship is directly related not only to the subsidies available for entities but to the willingness of targets to invest and pay for EE. As survey data shows, most people are unwilling to pay higher prices or



taxes for the environment, thus the cost of EE is pushed onto the government. Paradoxically, due to the insufficient amount of funding or rejection of funding due to its caveats, the cost of EE is pushed back onto EE entities as the intermediary between targets and the government. Without appropriate measures to finance programs and EE professions, upcoming graduates from EE-related programs and university institutes struggle to enter the field as typically elderly and retired individuals have the most financial freedom and time to commit. Consequently, the pursuit of corporate EE and increasing collaborations with industry were advocated by three interview participants to be promising avenues for EE development.

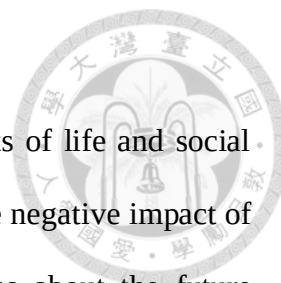
6.34 Culture

Culture remains a crucial aspect of the attitudes and established norms surrounding sustainability and pro-environmental behaviour, especially with the rise of globalisation. As noted by two interview participants, the earliest peoples and egalitarian societies had lifestyles that were less harmful to the environment and were arguably more attuned to their impact on natural ecosystems. Organisations practising cultural EE were suggested to have greater difficulty in becoming certified and due to EE's origins in the environmental sciences and jurisdiction of the EPA, personnel were either unequipped or reluctant to incorporate cultural dimensions into their programs. Interestingly, cultural factors featured in both the future aspirations and fears of organisations relating to EE. Interview participants simultaneously cited its influence on intrinsic motivation but also its capacity for disillusionment if society does not recognise the historical development of culture itself. Despite this potential, no interview participants stated culture currently influenced the major decisions affecting their entity, however one noted generational differences as a key lesson for the future. This could indicate that culture is a valued component but does not consciously inform the direction or delivery

of EE at present. Religious groups with moral foundations aligned with pro-environmental belief systems and philosophy were proposed as a strong organisational force due to their ability to mobilise resources and followers. Mutual learning between secular and non-secular groups could be used to address the implications of environmental action/inaction and promote greater solidarity behind collective action to improve environmental values as highlighted by survey data.

6.35 Environment

As the basis of EE, the dynamics of environmental change and degradation should remain at the core of its practice. Across a variety of issues, the importance of up-to-date and relevant information was necessary to ground EE in evidence-based observation. EE's historic emphasis on energy and pollution issues, globally and in Taiwan, remains a key component in the national curriculum and recommended direction of programs. To align with the government's promotion of Net Zero policy, entities have been encouraged to engage with concepts related to carbon emissions and carbon footprint in the national abstract. If managed effectively, the coordination of entities to campaign under same environmental initiatives could amplify the reach and penetration of ideas and concepts related to them, however care should be taken to ensure the use of stances remain consistent to avoid confusion and disinterest. For interview participants, uncertainty about the future state of the environment comprised almost a third of all questions. This occurrence, in combination with a third of questions relating to EE pedagogy and practice, could suggest personnel are curious about the effectiveness of EE in relation to its impact and the mitigation of environmental harm. This point echoes concerns by three interview participants that EE is becoming performative and losing sight of its mission.



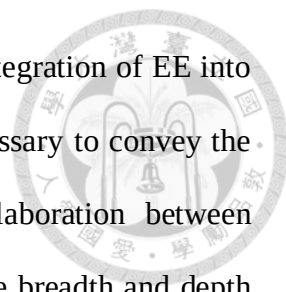
6.36 Technology

Modern advancements in technology have revolutionised all aspects of life and social development, albeit for better or worse. While survey data shows the negative impact of modern lifestyles on the planet is well understood, two questions about the future considered whether technology could be the answer to pressing environmental problems. Innovative applications in industry and pedagogy were highlighted as possible strategies in mobilising and engaging different stakeholders for environmental protection. The accessibility and ease of online platforms in sharing information with audiences were also repeatedly affirmed to be a valuable development in recent history but could not replace face-to-face interactions. This development was directly related to two tangible program outcomes in fostering collaboration between targets, entities and partners. Technology was often coupled with economic factors as a tool to make production systems more environmentally friendly yet efficient. As three of the interview participants were very involved in industry, their hopes resided in the belief that technology would rise to meet our current consumption and production levels, an outcome far more likely than reducing them.

6.37 Strategic Approaches by Targets

Future EE policy must employ a tailored approach to address the unique barriers to behavioural change experienced by its targets. Within the dimensions of the Theory of Planned behaviour, this study makes the following suggestions to the central authorities for the following target groups: children (under 15 years old), youth (15-24 years old), adults (24-64 years old) and the elderly (65 years and older).

- For children, the TEEA should continue to support the development of positive environmental attitudes and values through teaching issue awareness, ecological



knowledge, and practical skills for sustainability. Holistic integration of EE into the formal system with the most current information is necessary to convey the rapid emergence of environmental issues. Increased collaboration between formal, informal and non-formal institutions can enhance the breadth and depth of topics covered, as well as ensure sufficient attitudes for pro-environmental behaviour are nurtured.

- For youth, the TEEA should maintain support for higher education programs and invest in EE careers through professional development and training programs. Due to their financial and social status, youth may have the lowest perceived behavioural control in pro-environmental behaviour. Therefore, programs for this target demographic should address this dimension. Increasing participation in EE, whether by increasing the time requirements or expanding target pool, could also enhance growth in the sector and further secure talent for the continuation of EE.
- For adults, the TEEA should clarify its promotion and legislative framing to guide expectations regarding who and what is EE for. By attracting greater adult participation in EE, the TEEA can significantly enhance subjective norms for pro-environmental behaviour and develop habitual practices within the household unit. Incentives for private participation in EE should be careful to evaluate genuine engagement in programs and enhance industry collaborations to ensure accountability with future protections to mitigate the manipulation of EE entities or personnel for political gain. While technology has the potential to assist environmental protection, it should not be presented as the sole solution to environmental degradation and the importance of behavioural change should be maintained.

- For the elderly, the TEEA has not introduced regulations to harness the potential of this demographic group who may have greater financial freedom and more time for leisure. Encouraging programs specific to the elderly can provide community care and improve their quality of life after retirement. The elderly may face the lowest degree of subjective norms, therefore supporting the establishment of programs with practical elements and volunteering could facilitate a community-based culture for pro-environmental behaviour.

Chapter 7: Conclusion



The Taiwan Environmental Education Act (TEEA) represents the innovative use of policy for pro-environmental behavioural change in Taiwan, setting an ambitious precedent that environmental education is an urgent, necessary and valuable pathway to sustainable development. Since its enactment in 2011, the number of entities, facilities and personnel has been growing steadily through training courses and certification, forming an established system of EE practitioners across eight EE topics. Supporting EE entities – the frontline of this policy and intermediary between the central authorities and public – is imperative to the success and continuation of EE in Taiwan. However, in order to realise their potential and improve their performance, key regulations regarding incentives and resources must be amended. While the cognitive dimensions of EE have shown demonstrated change in the general population, pro-environmental behaviour has seen negligible to small change in the selected variables within the past decade. Conversely, the ability of the public to navigate complex moral decisions and estimations about environmental issues has worsened, indicating critical thinking and issue prioritisation became more challenging in 2020. These phenomena may be at no fault of the TEEA, future environmental policy must adapt to broader dynamics in society and their influence on environmental attitudes, values and behaviours in order to achieve its goals. Specifically, the challenges of economic hardship, political instability, cultural extinction, generational handover, industrial innovation, and ecological collapse represent emerging threats and critical factors in the implementation of the TEEA and delivery of EE.

Further research to identify the prevalence and frequency of other pro-environmental behaviours in the public within this period could provide more insight into the impact of the TEEA. Additionally, more interviews with other types of EE entities could explore

the unique challenges others may face as the sample size of five participants can only offer a glimpse into the lived experiences of personnel. However, this study uniquely links multiple entities, temporal scales and dimensions of EE to generate links between macro- and micro-phenomena. Although the TEEA has achieved much in some dimensions of EE, regulations to address the perceived behaviours control and subjective norms for significant proportions of the population are needed to ensure pro-environmental behaviour is achieved with an adapted and tailored approach that can withstand dynamic changes and threats as they emerge.

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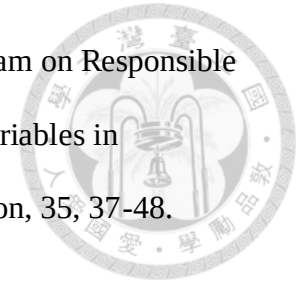
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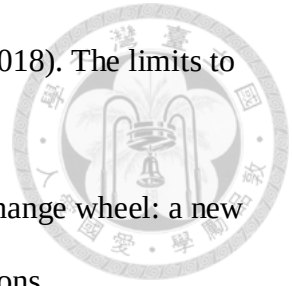
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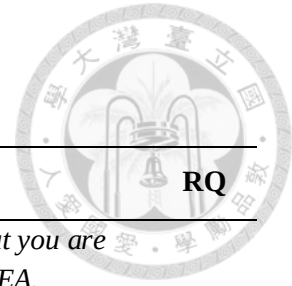
Appendices



Appendix A – ISSP Environment 2010 and 2020 Survey Variables and Questions

Theme	Code	Question
Environmental Attitudes	Q1	<i>How concerned are you about environmental issues?</i>
	Q2	<i>Almost everything we do in modern life harms the environment.</i>
	Q3	<i>Many of the claims about environmental threats are exaggerated.</i>
	Q4	<i>It is just too difficult for someone like me to do much about the environment.</i>
	Q5	<i>I do what is right for the environment, even if it costs more money or takes more time.</i>
	Q6	<i>There is no point in doing what I can for the environment unless others do the same.</i>
Environmental Values	Q7	<i>How willing would you be to pay much higher prices in order to protect the environment?</i>
	Q8	<i>How willing would you be to pay much higher taxes in order to protect the environment?</i>
	Q9	<i>How willing would you be to accept cuts in your standard of living in order to protect the environment?</i>
	Q10	<i>There are more important things to do in life than protect the environment.</i>
	Q11	<i>We worry too much about human progress harming the environment.</i>
	Q12	<i>We worry too much about the future of the environment and not enough about prices and jobs today.</i>
Pro-Environmental Behaviour	Q13	<i>How often do you make a special effort to sort glass or tins or plastic or newspapers and so on for recycling?</i>
	Q14	<i>How often do you avoid buying certain products for environmental reasons?</i>
	Q15	<i>Are you a member of any group whose main aim is to preserve or protect the environment?</i>
	Q16	<i>In the last five years, have you signed a petition about an environmental issue?</i>
	Q17	<i>In the last five years, have you given money to an environmental group?</i>
	Q18	<i>In the last five years, have you taken part in a protest or demonstration about an environmental issue?</i>

Appendix B – Scenario-based Interview Guide



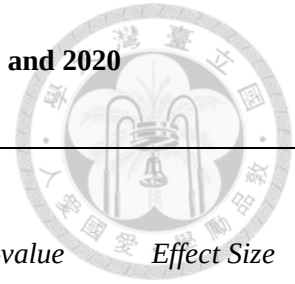
Section	Questions	RQ
Current Scenario	<i>Describe an event or program within the past year that you are proud of that has delivered in accordance with the TEEA.</i>	
a) Interactions		
b) Roles	i) What was your role?	
c) Setting	ii) What was the goal of the program?	
d) Goals	iii) How was this program delivered?	RQ2
	iv) What were the benefits?	
* may refer to EPA, MOE or any relevant authority.	v) What were the costs?	
	vi) How did the TEEA* support this program?	
	vii) How could the TEEA* support better support this program?	
Claims	i) What were the outcomes of this event/program?	
a) Measurable	ii) What changes have you seen as a result?	
b) Tangible	iii) What surprised you about the outcomes of this event/program?	RQ2
c) Intangible		
d) Unrealised	iv) If you could improve anything, what would you change?	
Envisioned Scenario	<i>Describe an event or program that you would like your organisation to deliver if you were leading the project.</i>	RQ2/3
	i) What needs are not currently met to deliver this program?	
	ii) How could these needs be addressed?	
	<i>Based on your described scenario and professional experience...</i>	
Claims	i) What economic factors do you see as critical for the future of EE? If you do not think this factor is relevant, please skip.	
Six Sector Approach	a) environmental	RQ3
	b) cultural	
	c) demographic	
	d) governance	
	e) technological	
Claims (Adapted) Seven Questions Approach	i) If you could pose three questions about the future and receive an answer, what would you ask?	
	ii) What important events from the past few years provide good lessons for the future?	RQ3
	iii) What major decisions with long-term implications are you currently dealing with?	
	iv) In the best possible world, what would you hope for?	
	v) In the worst possible world, what are your greatest fears?	

Appendix C – SWIMs and Claims Analysis Coding



I'm the Executive Director of the office...	Role
So we have the Animal Parade, we go into schools. We encourage children and the teachers and the families to come together and create all kinds of costumes, animal costumes. So they come to the parade dressed as animals. So they picked out their favourite animal and they come, and their costume will be made of recycled materials.	Interactions
So it's also a recycling programme . But it's also very much a wildlife, getting to know wildlife programme . And then they get to the streets, and we have music and we have a lot of fun.	Task Goal
Last year, we had the parade in Tainan, and 800 children took to the streets dressed up as animals. And they were so loud and so cheerful and so noisy, but the kids had a lot of fun . And the people who are involved had a lot of fun .	Claim: measurable
	Claim: tangible
And, I think that addresses a very human need in us, is to enjoy life as it is. So, it's a wonderful idea to enjoy life together with these animals.	Claim: intangible
Of course, they're not the real animals. But I think it brings a focus to the children that "Oh, it's so fun to be part of this thing." and also to be able to speak out for the animals they're pretending to be.	Claim: intangible

Appendix D – Statistical Analysis Outputs for ISSP Environment 2010 and 2020



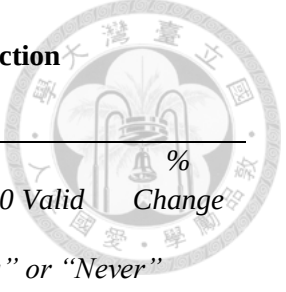
Theme	Code	2010		2020		p-value	Effect Size
		median	SD	median	SD		
Environmental Attitudes	Q1	4	0.95	4	0.93	0.129	0.24
	Q2	2	0.92	2	0.88	0.036*	0.03
	Q3	3	1.06	4	1.05	8.632e-8***	0.09
	Q4	4	0.89	4	0.89	0.313	0.016
	Q5	2	0.72	2	0.68	0.095	0.026
	Q6	3	1.02	2	1.06	0.351e-5***	0.073
Environmental Values	Q7	2	1.15	3	1.16	1.301e-7***	0.083
	Q8	4	1.21	4	1.15	0.133	0.24
	Q9	2	1.20	2	1.10	7.416e-14***	0.120
	Q10	2	0.90	2	0.88	0.704	0.01
	Q11	2	0.98	2	1.01	4.396e-8***	0.09
	Q12	4	1.06	3	1.05	0.005*	0.04
Pro-Environmental Behaviour	Q13	2	0.77	1	0.72	~0***	0.19
	Q14	3	0.92	3	0.95	0.956	0.001
	Q15	2	0.21	2	0.19	0.251	0.018
	Q16	2	0.20	2	0.29	7.811e-11***	0.10
	Q17	2	0.30	2	0.29	0.426	0.013
	Q18	2	0.12	2	0.11	0.313	0.016
Average SD		0.81		0.80			

* p<0.05

** p<0.01

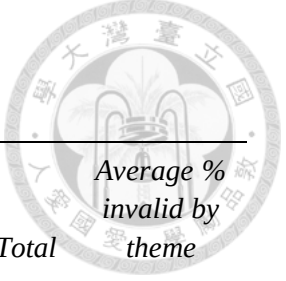
*** p<0.001

Appendix E – Pro-Environmental Behaviour: Irregular Action and Inaction



Code/Question	2010 Valid Response – “Sometimes” or “Never”	2020 Valid Response – “No”	% Change
Q13 How often: recycling	13.99%	8.73%	-5.26**
Q14 How often: avoid buying certain products	59.57%	62.07%	+2.50
Q15 Member of an environmental group	95.38%	96.16%	+0.78
Q16 In the last five years: signed a petition	95.97%	91.00%	-4.97**
Q17 In the last five years: given money	90.00%	90.78%	+0.78
Q18 In the last five years: taken part in a protest	98.42%	98.79%	+0.38

Appendix F – Invalid Responses by Survey Year and Variable Theme



Theme	Code	p-value	2010		2020		Average % invalid by theme
			Count	% Total	Count	% Total	
Environmental Attitudes	Q1		2	0.09	8	0.44	1.16
	Q2	*	25	1.13	67	3.68	
	Q3	***	48	2.17	46	2.52	
	Q4		11	0.50	19	1.04	
	Q5		13	0.59	23	1.26	
	Q6	***	4	0.18	6	0.33	
Environmental Values	Q7	***	9	0.41	27	1.48	1.79
	Q8		9	0.41	24	1.32	
	Q9	***	8	0.36	9	0.49	
	Q10		30	1.36	46	2.52	
	Q11	***	33	1.49	95	5.21	
	Q12	*	30	1.36	92	5.05	
Pro- Environmental Behaviour	Q13	***	1	0.05	4	0.22	0.08
	Q14		8	0.36	4	0.22	
	Q15		1	0.05	0	0.00	
	Q16	***	1	0.05	0	0.00	
	Q17		1	0.05	0	0.00	
	Q18		0	0.00	0	0.00	
Average % invalid by year				0.38		0.76	

Note: “Average % invalid by year” is based only on variables that have a statistically significant distribution change between the 2010 and 2020 datasets