SUSTAINABLE DEVELOPMENT SOLUTIONS NETWORK
A GLOBAL INITIATIVE FOR THE UNITED NATIONS

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BUILDING THE CAPACITIES OF EDUCATORS IN EDUCATION FOR SUSTAINABLE DEVELOPMENT

REPORT OF A PILOT EDUCATOR TRAINING PROGRAMME IN MALAYSIA

MAY 2025

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MISSION 4.7: ESD EDUCATOR TRAINING PROGRAMME Report of the Pilot Intervention

May 2025

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The Sustainable Development Solutions Network (SDSN) engages scientists, engineers, business and civil society leaders, and development practitioners for evidence-based problem solving. It promotes solutions initiatives that demonstrate the potential of technical and business innovation to support sustainable development.

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Abbreviations

CBO	Community-based Organisation
CMT	Certified Master Trainers
CSO	Civil Society Organisation
ESD	Education for Sustainable Development
FGD	Focus Group Discussion
GCED	Global Citizenship Education
GEP	Greening Education Partnership
HOTS	Higher Order Thinking Skills
IPG	Institut Pendidikan Guru (Teacher Education Institutes)
MD	Mean Difference
MEB	Malaysian Education Blueprint
MOE	Ministry of Education
NEP	National Education Philosophy
NGO	Non-governmental Organisation
PD	Professional Development
PISA	Programme for International Student Assessment
PISMP	Program Ijazah Sarjana Muda Perguruan (Bachelor of Education - Teaching)
RSP	A Rounder Sense of Purpose
SD	Sustainable Development
SDG	Sustainable Development Goals
SDSN	UN Sustainable Development Solutions Network
SK	Sekolah Kebangsaan (National Primary School)
SJK (C)	Sekolah Jenis Kebangsaan (Cina) [National Type School (Chinese)]
SJK (T)	Sekolah Jenis Kebangsaan (Tamil) [National Type School (Tamil)]
SMK	Sekolah Menengah Kebangsaan (National Secondary School)
SMD	Standard Mean Difference
STEM	Science, Technology, Engineering and Mathematics
TIMSS	Trends in International Mathematics and Science Study
UN	United Nations
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization

EXECUTIVE SUMMARY

This report serves as both reference as well as guidepost for transforming education in Malaysia through Education for Sustainable Development (ESD). It presents the outcomes of a piloted Educator Training Programme by the UN Sustainable Development Solutions Network (SDSN), designed to empower educators in Malaysian schools as the key drivers of improving the experiences, learning outcomes, and future prospects for Malaysian students.

ESD SUPPORTS NATIONAL ASPIRATIONS

ESD can be a powerful foundational element for transforming Malaysia's K–12 education system into one that is future-relevant, equitable, and quality-driven. With its emphasis on building future-relevant competencies,[1] it supports Malaysia's National Education Philosophy (NEP) and the Malaysia Education Blueprint (MEB), both of which emphasise holistic development, higher-order thinking, and readiness for a global economy.

Despite these aspirations, a 2022 study by SDSN found that systemic gaps exist:

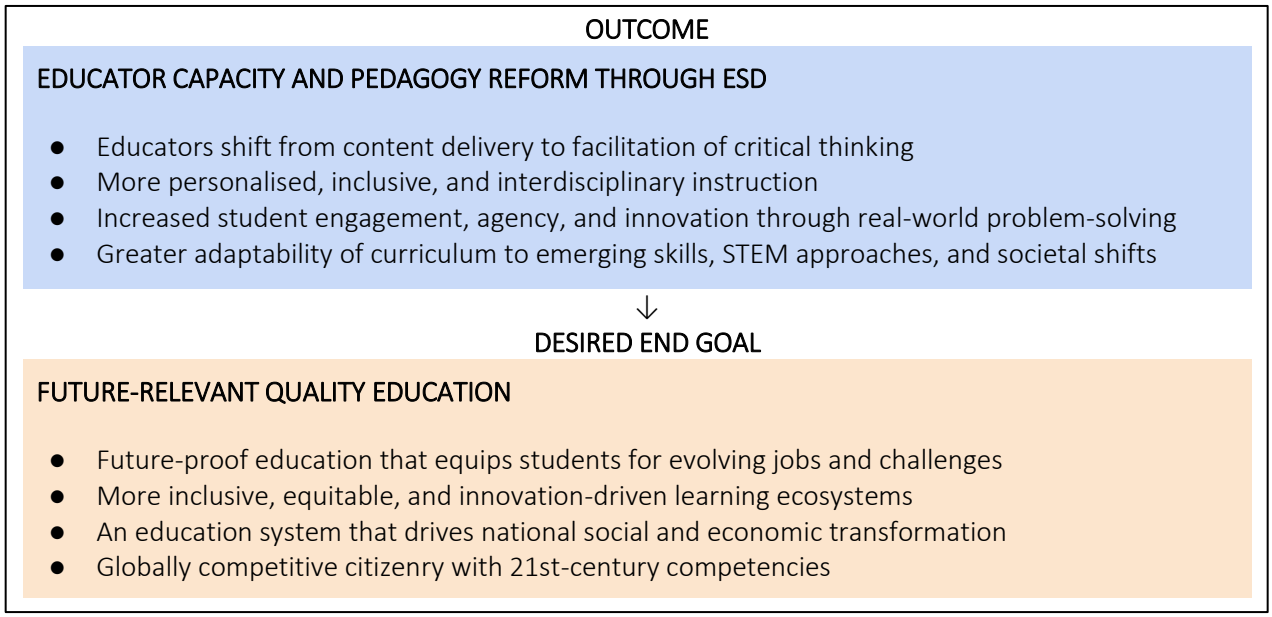
- **Insufficient educator understanding of sustainable development:** Many educators lack a clear understanding of sustainable development principles and how to incorporate them in the classroom.
- **ESD is not explicit in policy documents:** Current national education policies do not explicitly reference ESD, leading to inconsistent support for ESD-related initiatives across schools.
- **ESD elements exist in curriculum but are indistinguishable as part of a cohesive framework:** While sustainability elements are in the curriculum, effectiveness in delivering their corresponding competencies may fall short without a cohesive ESD framework.

[1] The eight ESD competencies as prescribed by UNESCO are: i) systems thinking; ii) anticipatory competency; iii) normative competency; iv) strategic competency; v) critical thinking; vi) self-awareness; vii) collaboration; and viii) integrated problem-solving (UNESCO, 2017).

ESD AS A BASIS FOR A FUTURE-RELEVANT HIGH-QUALITY EDUCATION SYSTEM

This report proposes the following result chain focusing on ESD educator training to arrive at the desired end goal of future-relevant quality education.

FIGURE I: Proposed intended outcome that will support the desired end goal



DEVELOPMENT & EXECUTION OF THE INTERVENTION

The ESD Educator Training Programme, developed by SDSN and piloted in seven select Malaysian public schools, aimed to empower educators with the principles, competencies, and innovative pedagogies necessary to integrate ESD into their teaching practices, fostering critical thinking, interdisciplinary collaboration, and actionable solutions for sustainability challenges.

Objectives of the intervention:

1. Fostering change by cultivating a sustainable development mindset among educators
2. Familiarising educators with core ESD competencies
3. Equipping educators with transformative pedagogies
4. Fostering school-community collaboration to apply learning meaningfully
5. Putting forth a scalable model for national ESD capacity building for educators

The intervention was designed around three core components:

1. Addressing Training Barriers: The programme intentionally moved away from the typical "train-one-representative" cascading model, adopting instead a whole-school training approach to ensure shared understanding, collective ownership, and peer support among all educators within participating schools.

2. **Developing Content**: Content was organised into four integrated modules:
    a. Awakening a Sustainability Mindset
    b. Essential Educator Competencies for ESD
    c. ESD Teaching-Learning Approaches
    d. Collaborative Partnerships and Networking

   (Content from a fifth module, Educators as Change-makers for the Future, was integrated throughout.)

3. **Building Resources and Evaluation Tools**: The programme produced a full suite of localised learning and facilitation materials, including Trainer's Guides, Module Handbooks, Teacher Editions, and a variety of research instruments (pre- and post-module surveys, personal logs, assessments, and facilitators' observation logs).

TABLE I: The seven pilot schools

School	Description[2]
SMK St Mary, Kuala Lumpur	All-girls Secondary School Total number of educators: 66 Total number of students: 1106
SMK Pedas, Negeri Sembilan	Rural Secondary School Total number of educators: 49 Total number of students: 451
SMK Dato Harun, Tanjung Karang, Selangor	Rural Secondary School Total number of educators: 84 Total number of students: 678
SK Putrajaya Presint 18(1), Putrajaya	Primary School Total number of educators: 152 Total number of students: 2400
SK Dato' Onn Jaafar	Primary School Total number of educators: 45 Total number of students: 673
SJK (T) Tun Sambanthan	Primary Chinese Vernacular School Total number of educators: 37 Total number of students: 571
SJK (C) Tun Tan Cheng Lock	Primary Tamil Vernacular School Total number of educators: 43 Total number of students: 882

[2] All school data is as of 30 December 2024.

TABLE II: Key features of the programme

Feature		Description
1	Pre-training Engagement	School visits were held to introduce the programme, align expectations, answer questions, and secure buy-in from school leaders and educators.
2	Whole-school Training	All educators in each school participated to promote shared understanding, collaboration, and a unified approach to ESD.
3	Modular Approach with Strategic Gaps	Four spaced modules allowed time for application, reflection, and peer sharing, reinforcing a cycle of continuous learning.
4	Curriculum-aligned Integration	ESD was embedded within existing subject syllabi to reduce workload and enhance lesson relevance, rather than treated as an add-on.
5	Use of Local Examples	Locally relevant case studies connected global sustainability issues to Malaysian contexts, making concepts relatable and actionable.
6	Hands-on Learning Activities	Practical, experiential activities encouraged educators to apply ESD principles in lessons and student-led initiatives.
7	Collaborative Group Work	Interdisciplinary groupings fostered diverse perspectives, teamwork, and transdisciplinary thinking.
8	Open-ended Facilitation	A non-prescriptive format empowered educators to explore ideas creatively and independently, fostering innovation.
9	Reinforcement of Core Frameworks	Key ESD principles were revisited across modules to deepen understanding and support mastery.
10	Data-driven Monitoring and Reflection	Pre- /post-module surveys and educator logs enabled evidence-based programme improvement and supported educator reflection and professional growth.

RESEARCH METHODOLOGY AND ANALYSIS

The programme was evaluated using a concurrent mixed-methods approach, combining surveys, assessments, and reflections. Quantitative tools included pre- and post-module surveys, module assessments, and an end-of-programme commitment survey. Data was collected from all seven pilot schools, although sample sizes declined from Module 1 to Module 4. Quantitative data was analysed using Mean Differences (MD) and Standardised Mean Differences (SMDs). All instruments showed high reliability (Cronbach's alpha 0.83–0.99).

Qualitative data from educator logs, trainer observations and reflections, and open-ended questions in the pre- and post-module surveys were thematically analysed using the constant comparative method. Peer debriefing and triangulation ensured rigor and credibility. This robust methodology enabled the team to capture both measurable impact and deeper insights into educator learning and application.

POSITIVE INTERVENTION EFFECTS THAT WOULD GREATLY IMPROVE WITH THE RIGHT ENABLING ENVIRONMENT

TABLE III: Quantitative intervention effects complemented by qualitative insights

Objective	Quantitative Result	Qualitative Insight
1 Fostering change by cultivating a sustainable development mindset	Medium intervention effect (SMD = 0.7). Significant increase in familiarity with ESD concepts, sustainability principles, and the four SD pillars.	Educators are moving towards a sustainable development mindset, though many responses remain surface-level, indicating how new educators are to the concepts.
	Module 1 has contributed to fostering change among pilot participants towards being more familiar with the ESD terminologies, the 4 ESD pillars, and sustainability literacy.	
2 Familiarising educators with core ESD competencies	Small to medium effect (SMD = 0.1–0.5). Strongest gains in "Learning to Live Together" and "Learning to Do."	Educators began linking ESD competencies to classroom contexts and local issues, reflecting growing awareness of their roles as sustainability educators.
	Module 2 has raised awareness of all four categorisations of ESD competencies, albeit higher in "Learning to Live Together" and "Learning to Do" than in "Learning to Know" and "Learning to Be."	
3 Equipping educators with transformative pedagogies	Medium effect (SMD = 0.6). Notable improvement in understanding interdisciplinary and transdisciplinary approaches.	Educators found these approaches innovative and challenging. Many adapted them to their subjects, though time constraints and unfamiliarity with these strategies were noted as barriers.
	Module 3 made the educators see the potential of the Multi-, Inter- and Transdisciplinary pedagogical approaches in ESD, although their struggle to complete the existing syllabus places constraints on applying these approaches.	
4 Fostering school-community collaboration to apply learning meaningfully	Small effect (SMD = 0.1–0.3). Limited understanding of systemic collaboration.	Initial views centered on one-off events. Post-training responses indicated interest in longer-term partnerships with NGOs and community actors.

	Module 4 results suggest that there is still a long way to go to attain deeper understanding of mutually beneficial collaboration. With greater exposure, educators would be able to deepen their appreciation for the potential of school-community collaboration to be engines of more meaningful learning (and not merely for activities).

UNTAPPED POTENTIAL DUE TO NARROW UNDERSTANDING OF PROFESSIONAL DEVELOPMENT AND OF TEACHING AS A PROFESSION

While the intervention produced measurable improvements in ESD knowledge and practices, the data revealed broader issues related to how professional development and the teaching profession itself are understood within the Malaysian education system.

The untapped potential of educators

Despite structural challenges, educators demonstrated strong willingness and capacity to engage with ESD, given its meaningful, future-relevant, competency-based, contextual, and collaborative value proposition for teaching and learning. The intervention uncovered a significant reservoir of professional potential that remains underutilised due to traditional training models, siloed school environments, and limited systemic support.

Narrow understanding of "professional development"

Educators generally equated professional development with content delivery and compliance-based tasks, rather than as a reflective, iterative, or transformative process. This limited understanding may explain the reluctance or hesitation in adopting student-centred, interdisciplinary, or collaborative practices—hallmarks of ESD pedagogies.

The need to reframe teaching as a profession

The programme surfaced the need to reframe teaching not just as a job but as a vocation grounded in agency, purpose, and leadership. Many educators lacked opportunities to see themselves as changemakers or thought leaders. The training's emphasis on educator empowerment helped begin this shift in perspective, but sustained transformation will require systemic affirmation of teachers as co-designers of educational change.

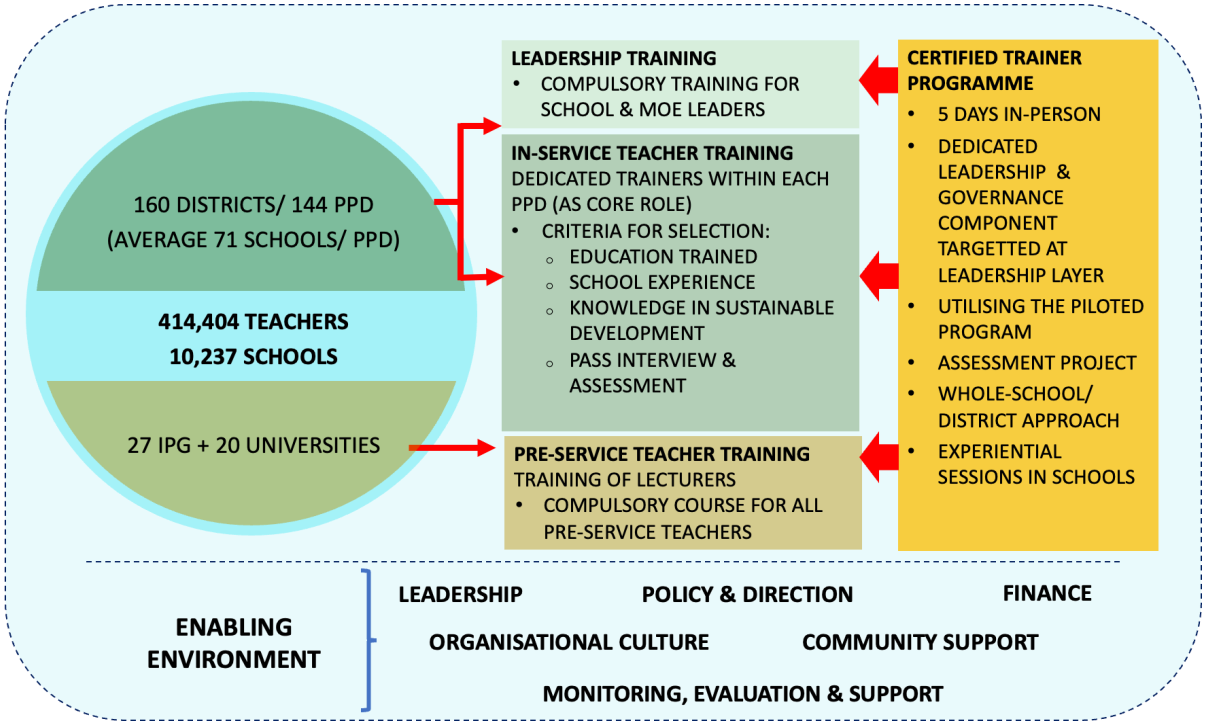
The intervention was not only a training programme but a mirror reflecting deeper cultural and systemic patterns within Malaysia's education landscape. The emergent insights highlight that technical training alone is insufficient. Effective ESD integration also requires a mindset shift in how society views educators, professional growth, and the purpose of education itself. Achieving future-relevant, quality education hinges on investing not only in what teachers know, but also in how they see their role, their capacity to act, and their value within the education ecosystem.

PRESENTING A MODEL FOR THE FUTURE OF EDUCATION IN MALAYSIA

The intervention effects and emergent insights present a very strong case for the upscaling of the ESD Educator Training Programme as the basis for a systemic, scalable, and future-relevant approach to embedding ESD across the national education ecosystem.

A key feature of scaling is having sufficient trainers to deliver the programme. There are approximately 10,237 public schools in the country, where 414,404 teachers are currently in service.[3] A district-to-district approach to upscaling is proposed. With 144 District Education Offices (*Pejabat Pendidikan Daerah*, or PPD), this translates to an average of 70 schools per PPD.

FIGURE II: ESD Educator Training Programme proposed scale-up plan



The key features of this plan are:

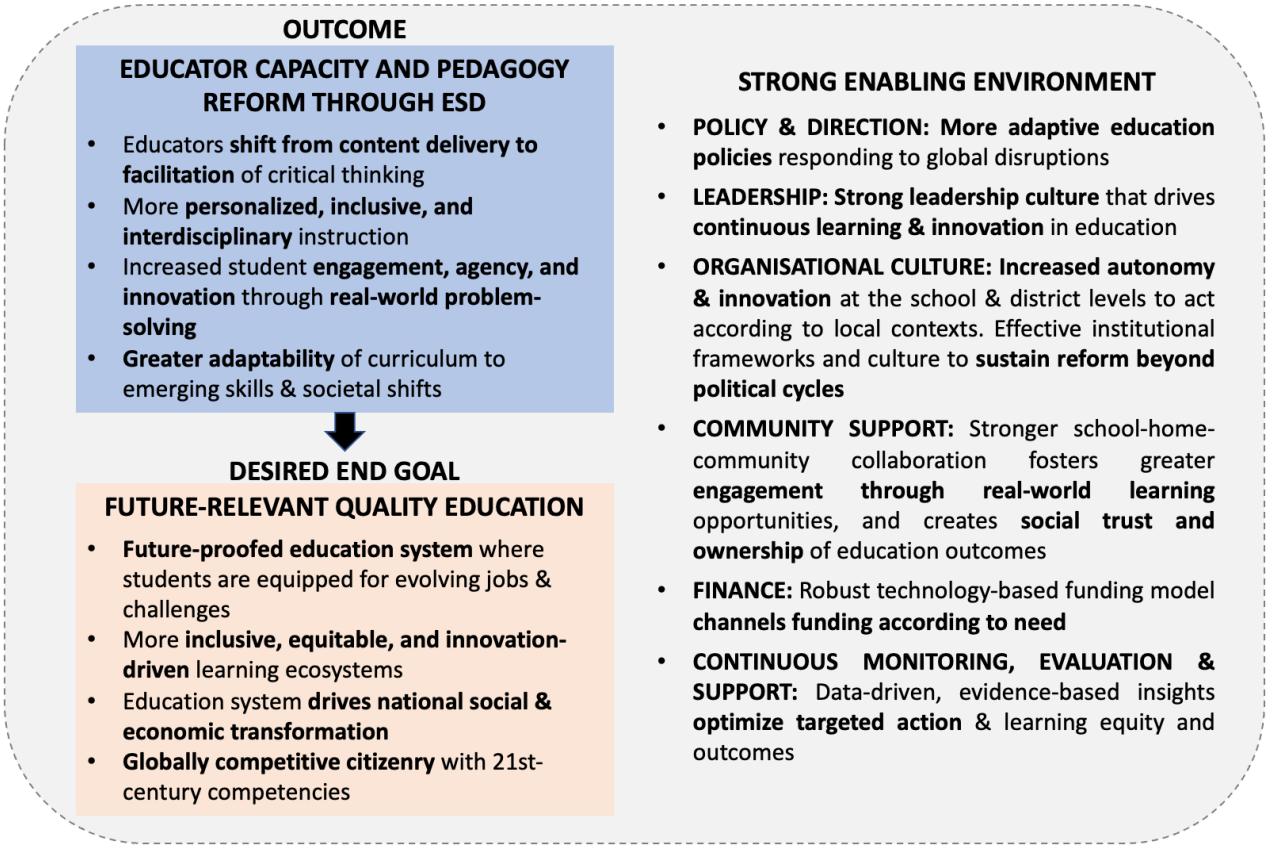
- Equity: Ensuring every teacher, regardless of location or school type, has access to transformative ESD learning opportunities.
- Systemic reach: Moving beyond isolated training to embed ESD practices into the fabric of schools, leadership, policies, organisational culture, and assessment frameworks.
- Context-driven: The scale-up is envisioned as not simply a replication of the pilot, but a dynamic and adaptable model tailored to local contexts and the unique needs of each school and district. PPDs, IPGs, and universities will act as regional hubs for training, monitoring, and support.

[3] Ministry of Education statistics as of 31 January 2025

EDUCATION TRANSFORMATION SUPPORTED BY KEY ENABLERS

The success of the scale-up hinges on enabling conditions that go beyond programme design. Six strategic enablers have been identified that will support the outcome of educator capacity and pedagogy reform through ESD, which will then contribute to achieving the desired end goal of Future-Relevant Quality Education.

FIGURE III: Enabling Environment to Support the Outcome and Desired End Goal



Several detailed recommendations are presented for each of the six enablers in Chapter 6, culminating in a bold proposition: that Malaysia become a regional and global model for how a public education system can catalyse sustainable development. This will require: i) a reimagined education system that values competencies over content, collaboration over silos, and purpose over procedure; ii) an empowered teaching force that views itself as a community of changemakers; and iii) a shift from "education for today" to education for the future.

TABLE IV: Recommendations to create the enabling environment to support the Outcome and Desired End Goal

Enabler	Supporting Recommendation
Policy & Direction Policy alignment ensures ESD is recognised, resourced, and embedded systemically	• Make ESD a priority in the next Education Blueprint to ensure long-term policy support. • Deploy suitable ministry, state, and district education officers to be solely responsible for ESD implementation. • Clearly emphasise the importance of educators' professional development in ESD in policy documents, guidelines, and directives. • Mandate the integration of ESD holistically across subjects, grade levels, and learning outcomes using existing curricula, revised 2027 curricula, and beyond.
Leadership Empowered, well-informed leaders (at the school and MOE levels) are critical for translating policy into practice, modelling ESD values, and enabling whole-school and system change.	• Champion widespread training for all education leaders. • Prioritise the training of the school leaders prior to the training of teachers in a particular school. • Empower leaders with the trust and autonomy to make decisions that they deem to be in the best interest of their school and community.
Organisational Culture Culture shapes how deeply reforms like ESD are embraced. A future-focused, learner-centered culture encourages professional growth, innovation, and shared ownership.	• Launch a national campaign to reposition education as future-oriented and competencies- and values-driven. • Integrate culture change and systems transformation in a formalised, large-scale leadership training programme. • Promote professionalism and ensure meaningful, regular professional development. • Shift away from syllabus completion and exam-oriented practices. Emphasise co-creation, feedback, and ESD competencies.
Community Support Communities are vital co-creators in education transformation. Structured partnerships ensure learning is relevant, relatable, rooted, and resilient.	• Institutionalise partnerships with local community stakeholders to take classroom learning to real world application. • Train educators to build reciprocal relationships with a focus on problem-solving and project-based learning. • Create a central platform for schools to showcase community projects and attract support.

Finance Strategic, sustained funding ensures ESD is prioritised, planned, and scaled beyond pilot projects. Finance must align with national goals and incentivise innovation.	• Establish earmarked funds within national and subnational education budgets for ESD initiatives. • Establish a digital platform to match schools with private funders based on need and merit. • Require alignment of donor funding with national ESD priorities. • Embed ESD into public financial management systems with clear tracking and reporting.
Continuous Monitoring, Evaluation, and Support Robust M&E systems are essential for improving effectiveness, ensuring accountability, and scaling impact based on evidence.	• Embed M&E tools and indicators from the start of programme implementation. • Develop M&E champions among educator trainers. • Use real-time digital tools for data sharing and responsive adaptation. • Integrate M&E findings into teacher professional learning and performance reviews.

1

INTRODUCTION TO THE REPORT

This report serves as both a reference as well as guidepost for transforming education in Malaysia through Education for Sustainable Development (ESD).[4] It presents the outcomes of a piloted Educator Training Programme by the UN Sustainable Development Solutions Network (SDSN), designed to empower educators in Malaysian schools as the key drivers of improving the experiences, learning outcomes, and future prospects for our students.

1.1 Reinforcing National Aspirations

ESD has emerged as a crucial foundation for equipping students with the knowledge, skills, values, and mindset needed for an evolving workforce and an increasingly complex global environmental, social, political, and economic landscape. The goals of ESD align with and reinforce Malaysia's educational aspirations to build a high-quality, inclusive, equitable, and innovation-driven learning ecosystem, ensuring that all students gain the skills needed to thrive in a rapidly changing world. By integrating sustainable development themes into education, the system will not only enhance individual competencies but also serve as a catalyst for national social and economic transformation, ultimately developing a globally competitive citizenry equipped with future-relevant skills.

ESD, therefore, supports the National Education Philosophy (NEP), which has remained steadfast for nearly 40 years[5] and states that:

> *Education in Malaysia is an ongoing effort towards further developing the potential of individuals in a holistic and integrated manner, so as to produce individuals who are intellectually, spiritually, emotionally, and physically balanced and harmonious, based on a firm belief in and devotion to God. Such an effort is designed to produce Malaysian citizens who are knowledgeable and competent, who possess high moral standards, and who are responsible and capable of achieving high levels of personal wellbeing as well as being able to contribute to the harmony and betterment of the family, the society, and the nation at large. (MOE, 1988/ 1996)*

The brilliantly crafted NEP affirms education as an "ongoing effort," implying both the imperative for it to respond to changing needs and circumstances, as well as the need for learning to be lifelong. The NEP also

[4] The term "ESD" is used in its broadest sense throughout this report, encompassing global citizenship education (GCED) and education for the 21st century. It refers to the type of education that is relevant and responsive in a world of complex, interrelated, and evolving challenges, and which can unlock solutions in the environmental, economic, social, cultural, and governance spheres that enable sustainable development.

[5] The NEP was written in 1988 and minimally revised for language in 1996.

emphasises the balance between knowledge, competencies, and values, and its role in producing a citizenry who will bring betterment to their own lives and to society at large.

Later, the Malaysia Education Blueprint (MEB) 2013-2025 (MOE, 2013) was developed in response to the need to equip Malaysian students with skills for a competitive global economy. The MEB strongly emphasises improving education quality, rather than just years of schooling, to drive national development. It outlines key reforms, such as enhancing educator quality, revamping the curriculum to focus on higher-order thinking skills (HOTS), and improving student outcomes to be comparable to the best international systems, as areas crucial for ensuring Malaysia's long-term economic prosperity and societal wellbeing.

Indeed, research shows that the quality of a country's education system is a pivotal predictor of its socio-economic development. A study by the International Monetary Fund, "Why Quality Matters in Education," confirms that higher educational quality leads to greater individual earnings and accelerates national economic growth. While the benefits of improved education quality may not be visible in the short-term, they yield substantial long-term socio-economic gains (Hanushek, 2005).

The new MEB for 2026-2035 is also expected to emphasise quality, as well as equitable access to quality. Having the MEB feature ESD as a key component will additionally elevate it as a key policy in ensuring quality education, as enshrined in SDG 4: "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all."

ESD is explicitly called for in SDG Target 4.7:

> *By 2030, ensure all learners acquire knowledge and skills needed to promote sustainable development, including among others through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship, and appreciation of cultural diversity and of culture's contribution to sustainable development.*

Research by UNESCO has shown that ESD supports the development of competencies[6] such as critical thinking, systems thinking, integrated problem solving, and collaboration (UNESCO, 2017). These competencies not only promote HOTS, aligned with the demands of international assessments like PISA and TIMSS, but also help build a future-relevant, high-quality education system that equips learners to thrive in an interconnected and rapidly changing world.

We therefore propose the following as the overall desired end goal of a transformed education system in Malaysia (Figure 1):

[6] The eight ESD competencies as prescribed by UNESCO are: i) systems thinking; ii) anticipatory competency; iii) normative competency; iv) strategic competency; v) critical thinking; vi) self-awareness; vii) collaboration; and viii) integrated problem-solving (UNESCO, 2017).

DESIRED END GOAL

FUTURE-RELEVANT QUALITY EDUCATION

- Future-proof education that equips students for evolving jobs and challenges
- More inclusive, equitable, and innovation-driven learning ecosystems
- An education system that drives national social and economic transformation
- Globally competitive citizenry with 21st-century competencies

FIGURE 1: Proposed desired end goal of a transformed education system

1.2 Findings from the Initial Study

SDSN's 2022 study, "Mission 4.7: The Status of Education for Sustainable Development in Malaysia", (Chand et. al, 2023) highlighted significant obstacles to achieving SDG 4.7 in the Malaysian education system, primarily due to a substantial gap in educators'[7] understanding of sustainable development concepts and pedagogies. Without a foundational grasp of sustainable development, educators struggle to design and deliver learning activities that would foster among students ESD competencies such as critical thinking, problem-solving, and socio-environmental awareness. This gap has created a barrier, preventing educators from integrating ESD meaningfully into existing curricula. Exacerbating this is the absence of explicit ESD references in education policy documents, which impedes effective implementation. While elements of sustainable development are discernible throughout both policy and the national curriculum, they are not clearly defined or distinguishable as part of a cohesive ESD framework.

Our study identified three primary challenges in integrating ESD into Malaysian public schools:

1. **Insufficient educator understanding of sustainable development:** Many educators lack a clear understanding of sustainable development principles and how to incorporate them into teaching practices. Without foundational knowledge in ESD, educators struggle to design engaging, real-world learning activities that promote ESD competencies, such as critical thinking, socio-environmental awareness, and problem-solving.

2. **ESD is not explicit in policy documents:** Current national education policies do not explicitly reference ESD, leading to inconsistent support for ESD-related initiatives across schools. This policy gap affects the extent to which ESD can be systematically prioritised or encouraged at the school level. Coupled with educators' lack of understanding of ESD, the policy gap results in very low levels of motivation to learn and apply new and different pedagogical strategies in order to transform teaching and learning in line with ESD principles.

[7] Throughout this report, we use "educators" to refer collectively to teachers and school leaders.

3. **ESD elements exist in curriculum but are indistinguishable as part of a cohesive framework:** While elements related to sustainability appear in the curriculum, they are not clearly defined or distinguishable as part of a cohesive ESD framework. This lack of structure and coherence leaves educators without clear guidance on how to incorporate sustainable development principles into their subject areas, and less so on how to leverage interdisciplinary and transdisciplinary learning opportunities.

These findings underscore the need for targeted interventions to address the systemic and knowledge-based barriers among educators that are hindering ESD integration in Malaysian schools.

1.3 Why Training?

Educators are pivotal in shaping students' perspectives and understanding of the world, making them central to the successful integration of ESD in the education system. Professional development of educators serves as a foundational step for ensuring long-term impact and sustainable change. The empowerment of teachers and school leaders is also the fastest and most wide-reaching strategy towards meaningful integration of ESD within Malaysia's education system. As educators gain skills and knowledge, they can apply those same skills and knowledge concurrently in the classroom, providing students with continual exposure to sustainability-relevant pedagogical approaches, including pedagogies inherent in sought after fields like STEM. Moreover, training provides a springboard for educators to model ESD competencies, creating a ripple effect that can influence school culture and community values, and align the education system with broader sustainability goals.

As our initial study revealed, many educators lack foundational knowledge of sustainable development concepts, limiting their ability to deliver engaging, impactful lessons that would help students build ESD competencies. Therefore, our team designed and developed the ESD Educator Training Programme, a targeted training intervention aimed at bridging this knowledge gap and empowering educators with the skills and resources to incorporate ESD in teaching practices.

By focusing on improving educators' understanding of sustainable development, as well as providing practical strategies for integrating ESD into daily teaching and learning, the intervention aimed at empowering educators to foster sustainability competencies in students and to begin closing the existing gaps between policy and practice. This approach not only benefits individual educators but also contributes to a sustainable educational framework that can foster longer term shifts in the Malaysian education system, making it the enabler of a better future for both learners and society at large. This is because ESD competencies are essential for empowering learners to become society's changemakers who will have a role in addressing humanity's greatest challenges, including the climate crisis, the destruction of natural ecosystems, persistent socio-economic inequities, and ongoing global conflict.

Therefore, we propose the intended outcome to support the overall desired end goal of education transformation in Malaysia (Figure 2):

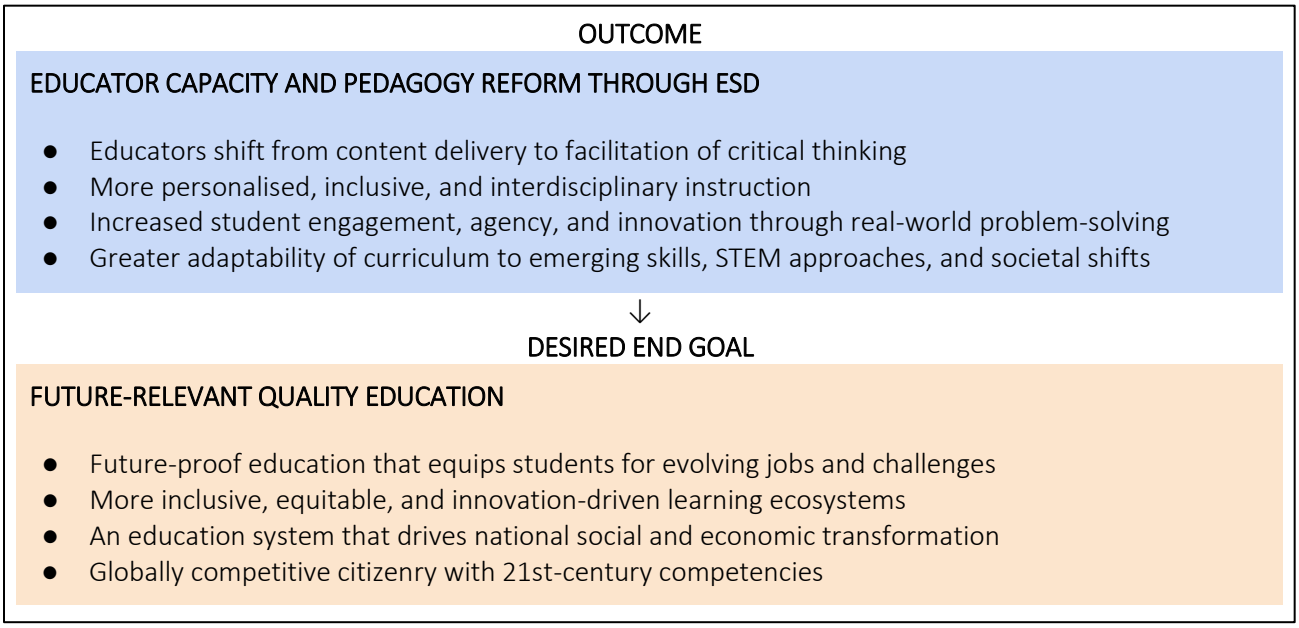


FIGURE 2: Proposed intended outcome that will support the desired end goal

1.4 Objectives of the Intervention

The ESD Educator Training Programme, piloted in seven select Malaysian public schools, sought to provide comprehensive training on sustainable development concepts, coupled with practical guidance on integrating these concepts into daily lesson planning.

The broad aim of the intervention was to empower educators with the principles, competencies, and innovative pedagogies necessary to integrate ESD into their teaching practices, fostering critical thinking, interdisciplinary collaboration, and actionable solutions for sustainability challenges.

The specific objectives of this intervention were:

1. **To foster change by cultivating a sustainable development mindset among educators**, promoting awareness, understanding, and practices that align with sustainable development principles and encourage integration of these values into their teaching methods.

2. **To familiarise educators with the core ESD competencies**, enabling them to apply these competencies confidently and effectively in the classroom, ensuring that they eventually are transferred to their students through teaching and learning activities.

3. **To equip educators with transformative pedagogies for the execution of ESD** by providing access to tools, model activities, and adaptable resources that facilitate the integration of ESD across diverse subject areas in ways that are engaging for students.

4. **To foster school-community collaboration to apply learning meaningfully**, encouraging partnerships between schools and their surrounding communities, and enabling educators and students to co-design and implement sustainability projects that address real-world challenges, thereby reinforcing the relevance and impact of classroom learning.

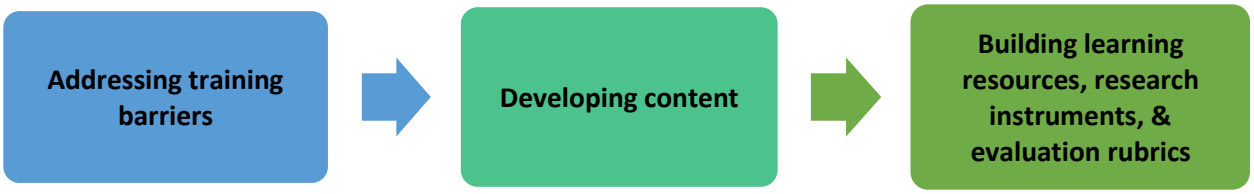
5. To put forward a robust model for ESD capacity-building for educators in Malaysian schools that can enable the desired transformation of embedding a culture of sustainability in schools and promote the continuous sharing of best practices. This model will be the basis of the scale-up of sustainability education for other schools in the country, and even outside it.

In this report, we present the methodology, execution, outcomes, and reflections from this pilot intervention, underscoring its implications for the broader nationwide integration of ESD in Malaysian schools. We then present a framework for scaling the intervention nationwide.

2

DEVELOPMENT OF THE INTERVENTION

Our initial study, "Mission 4.7: The Status of Education for Sustainable Development in Malaysia," provided the baseline for intervention development that consisted of three main components:



Crafting educator training in response to existing challenges and barriers to ESD implementation

Developing key content areas and structuring them into logical segments

Supporting educators with learning resources and evaluating learning outcomes

This pilot's objectives align with Malaysia's participation in global education mobilisation via UNESCO's Greening Education Partnership (GEP) (UNESCO, 2022) in the following ways:

- Explicit emphasis on cross-disciplinary engagement between teachers and subjects
- Integrating climate education as a main component for problem solving
- Incorporating transformation in the teaching and learning process, for learners to embrace complexity while making informed decisions and actions

The modules adopted the following localised approaches:

- Bringing together multiple ESD competency approaches in an integrated framework for educators to easily reference and acquaint themselves with ESD competencies
- Incorporating culture as one of the central pillars of sustainable development, alongside the GEP's suggested three: environment, society, and economy
- Developing tailored communication approaches for explaining and introducing key concepts of transformative education and interdisciplinary integration based on educators' existing knowledge

2.1 Addressing Training Barriers

Based on educator feedback obtained from the initial study, we tailored the programme to address the key challenges educators face regarding ESD training and post-training implementation. These adjustments were intended to support educators in upskilling themselves and implementing their learning within the school environment.

Barriers identified	Delivery customisation
Educators have difficulty accessing relevant ESD training.	Training is offered directly to schools and conducted in-person.
Educators who access ad-hoc training often undertake it as individuals and face the burden of cascading their learning.	To collectively raise the level of all educators' ESD awareness, training is conducted for all teaching staff.
Educators who access ad-hoc training bear the burden of ESD-related delivery on their own.	Because the training is offered to all educators in the school, educators are better equipped to support one another and can rely on peer professional support post-training. The shared experience of the training becomes a common reference point during application.

TABLE 1: Barriers identified in developing ESD competencies and customisation of delivery

2.2 Run-down of Programme and Modules

The frameworks, concepts, phases and levels, case studies, and tools were brought together to form cohesive modules in the following areas:

1. Awakening a Sustainability Mindset among Educators
2. Essential Educator Competencies for ESD
3. ESD Teaching–Learning Approaches and Techniques for Pro-Sustainability Behaviour
4. Collaborative Partnerships and Networking
5. Educators as Change-makers for the Future *(Initially intended as a standalone module, this content was later integrated within the four modules above.)*

The modules were designed to equip educators with the necessary perspectives to think and act as an ESD educator. Collectively, they form the building blocks for educator transformation to ensure as many learners as possible are given opportunities to gain the skills, knowledge, and experiences needed to transform their lives, communities, and wider society in line with sustainable development.

Apart from the four modules described below, an additional fifth module on "*Educators as Change-makers for the Future"* was initially intended to be delivered standalone, but its content was later adapted to be

interspersed throughout Modules 1–4. This was deemed appropriate as the module's objectives can be met through ongoing enculturation rather than standalone delivery.

Educators are key enablers of students' ability to solve society's complex problems, and the collective content of the four modules is intended to shape educators' noble purpose as the creators of future problem solvers. For this, they too require the competencies which exemplify change-making.

Module 1: Awakening a Sustainability Mindset among Educators

In this module, educators are introduced to eight sustainability literacy mindsets (Rimanoczy, 2021) and the four pillars of sustainable development. The module uses two seminal cases of historical environmental disasters: the use of DDT as a pesticide in the 1940s to 1960s, and the mercury poisoning in Minamata Bay, Japan, in the 1950s to late 1960s. In groups, educators construct their own conceptual map of the key takeaways. The session ends with groups presenting their concepts.

Module 2: Essential Educator Competencies for ESD

This module builds upon the sustainability literacy mindsets and the four pillars of sustainable development, and introduces educators to the competencies required for educators to act on such mindsets in their day-to-day work. These include the three main characteristics of ESD (Holistic Approach, Envisioning Change, and Achieve Transformation), the four major ESD Educator Competencies (Learning to Know, Learning to Live Together, Learning to Be, and Learning to Do), and twelve ESD-specific Educator Competencies (systems thinking, futures thinking, participation, critical thinking, responsibility, strategic thinking, self-awareness, empathy, values, trans-disciplinarity, and problem solving). Two local case studies are used to enable educators to apply their learning: river pollution in Kuala Juru, Penang, and the destruction of limestone hills in Perak.

Module 3: ESD Teaching–Learning Approaches and Techniques for Pro-Sustainability Behaviour

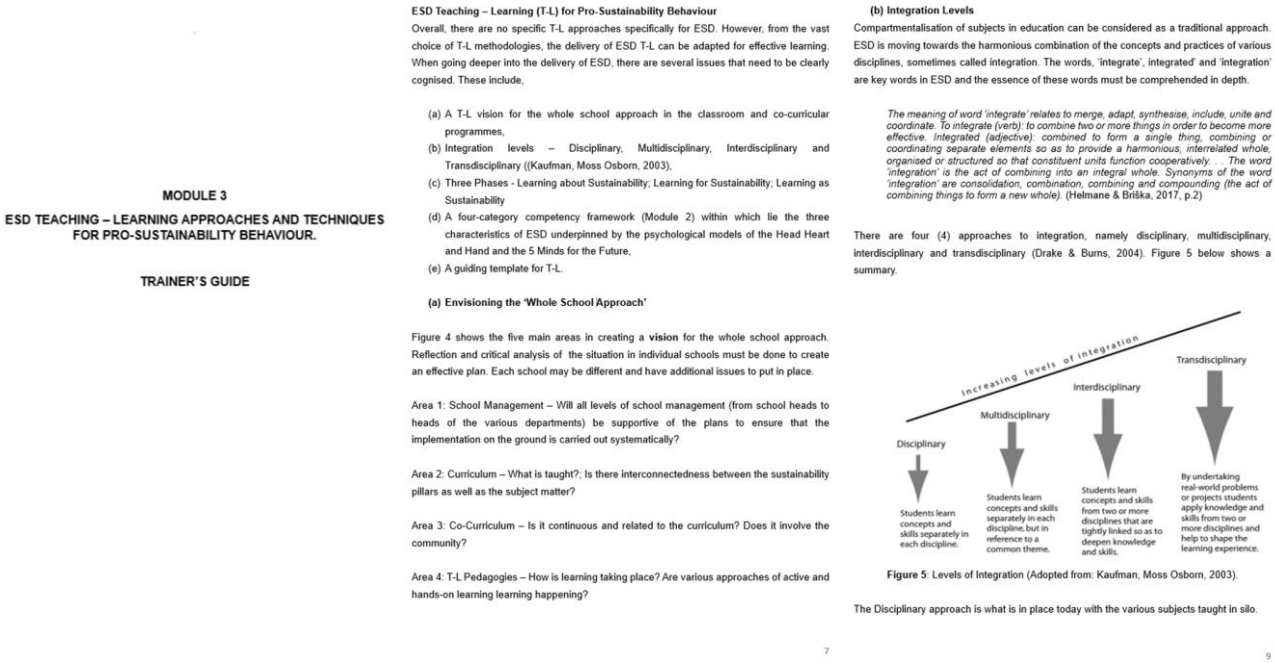
With educator competencies in place, educators are then exposed to three key approaches for successful ESD school transformation and delivery: the whole-school approach, integrative levels (interdisciplinary, multidisciplinary, transdisciplinary), and the three learning phases in sustainability educational pedagogy planning (Learning About Sustainability, Learning For Sustainability, and Learning As Sustainability). In this module, educators are also introduced to the SDGs as the current global framework for development.

Module 4: Collaborative Partnerships and Networking

This module involves creating cross-sector learning partnerships to increase students' immersive learning, real world exposure, and problem solving. These partnerships open avenues to increase education's relevance. The module provides educators with examples of partnerships and building networks with other schools and organisations. Educators are exposed to tools for mapping stakeholder involvement, creating a work plan, and assessing a given partnership.

2.3 How the Modules were Developed

2.3.1 Curation of multiple forms of content into cohesive Trainer's Guides



MODULE 3

ESD TEACHING – LEARNING APPROACHES AND TECHNIQUES FOR PRO-SUSTAINABILITY BEHAVIOUR.

TRAINER'S GUIDE

ESD Teaching – Learning (T-L) for Pro-Sustainability Behaviour

Overall, there are no specific T-L approaches specifically for ESD. However, from the vast choice of T-L methodologies, the delivery of ESD T-L can be adapted for effective learning. When going deeper into the delivery of ESD, there are several issues that need to be clearly cognised. These include,

(a) A T-L vision for the whole school approach in the classroom and co-curricular programmes,
(b) Integration levels – Disciplinary, Multidisciplinary, Interdisciplinary and Transdisciplinary ((Kaufman, Moss Osborn, 2003),
(c) Three Phases - Learning about Sustainability; Learning for Sustainability; Learning as Sustainability
(d) A four-category competency framework (Module 2) within which lie the three characteristics of ESD underpinned by the psychological models of the Head Heart and Hand and the 5 Minds for the Future,
(e) A guiding template for T-L.

(a) Envisioning the 'Whole School Approach'

Figure 4 shows the five main areas in creating a **vision** for the whole school approach. Reflection and critical analysis of the situation in individual schools must be done to create an effective plan. Each school may be different and have additional issues to put in place.

Area 1: School Management – Will all levels of school management (from school heads to heads of the various departments) be supportive of the plans to ensure that the implementation on the ground is carried out systematically?

Area 2: Curriculum – What is taught?; Is there interconnectedness between the sustainability pillars as well as the subject matter?

Area 3: Co-Curriculum – Is it continuous and related to the curriculum? Does it involve the community?

Area 4: T-L Pedagogies – How is learning taking place? Are various approaches of active and hands-on learning learning happening?

7

(b) Integration Levels

Compartmentalisation of subjects in education can be considered as a traditional approach. ESD is moving towards the harmonious combination of the concepts and practices of various disciplines, sometimes called integration. The words, 'integrate', integrated' and 'integration' are key words in ESD and the essence of these words must be comprehended in depth.

The meaning of word 'integrate' relates to merge, adapt, synthesise, include, unite and coordinate. To integrate (verb): to combine two or more things in order to become more effective. Integrated (adjective): combined to form a single thing, combining or coordinating separate elements so as to provide a harmonious, interrelated whole, organised or structured so that constituent units function cooperatively. . . The word 'integration' is the act of combining into an integral whole. Synonyms of the word 'integration' are consolidation, combination, combining and compounding (the act of combining things to form a new whole). (Helmane & Briška, 2017, p.2)

There are four (4) approaches to integration, namely disciplinary, multidisciplinary, interdisciplinary and transdisciplinary (Drake & Burns, 2004). Figure 5 below shows a summary.

Figure 5: Levels of Integration (Adopted from: Kaufman, Moss Osborn, 2003).

The Disciplinary approach is what is in place today with the various subjects taught in silo.

9

FIGURE 3: Example pages from a Trainer's Guide

ESD experts curated content for a four-module programme. Before the pilot, we created comprehensive guides to train the facilitators who would eventually deliver the programme. These Trainer's Guides were designed to provide sufficient context to allow a facilitator to grasp the material in depth. Each Trainer's Guide was presented to the entire programme team for familiarisation and feedback, which enabled the wider team to support module delivery.

The modules focused on educator-relevant frameworks, approaches, and phases and levels. Taken as a whole, these equip educators to align teaching and learning with the needs of a complex world.

The main frameworks and concepts are:

- Frameworks: Isabel Rimanoczy's Sustainability Literacy Principles (Rimanoczy, 2021); Howard Gardner's Five Minds for the Future (Gardner, 2006); UNECE's Key Educator Competencies for Educators in ESD (UNECE, 2012); ESD Educator Competencies from the European Union's *A Rounder Sense of Purpose* (RSP, 2019)
- Approaches: The Head, Heart, and Hands approach (Orr, 1992); the Whole-School Approach
- Phases and Levels: Learning for Sustainability Phases (About, As, For) (Gajparia *et al.*, 2022); Integration Levels (Interdisciplinary, Multidisciplinary, Transdisciplinary) (Kaufman *et al.*, 2003)

Frameworks in the Trainer's Guides were gradually integrated to demonstrate the linkages between them and provide a comprehensive overview of key educator competencies.

2.3.2 Independent reflection a key component of Trainer's Guides

Beyond the ESD content, the guides incorporate segments for personal learning and reflection. These serve to enhance the facilitator's independent learning in the subject matter.

After each key content area, the guides prompt facilitators' inquiry through reflection, presenting questions or thought-provoking passages. These are accompanied by space for the facilitators to record their thoughts and responses.

2.3.3 Curation of learning activities to accompany each Trainer's Guide

The Trainer's Guides also contain a run-down of each module, including each session's learning activities, case studies, and tools that support the activities. Examples include:

- International case studies: Environmental effects of the use of DDT as pesticide, from Rachel Carson's *Silent Spring*; mercury pollution by the Chisso Corporation in Minamata Bay, Japan
- Local case studies: Limestone hills in Perak; river pollution in Penang
- Tools: Partnership assessment checklists; a map of UNESCO's Learning Objectives by SDG

2.3.4 Developing learning resources and research instruments

For training rollout, the team organised module content into learning resources for educators. Module Handbooks and Teachers' Editions were written and distributed prior to the start of each module. Slides were distributed after each module to encourage self-study.

- Module Handbooks: Key concepts distilled into 10- to 15-page handbooks for immediate reference. These booklets are to be used in perpetuity by teachers as a quick refresher or as a source for ideas to carry out in their own classrooms and schools. Each comes with a set of reflection questions and a resource bank.
- Slides: Module content and learning activity prompts used during training.
- Teachers' Editions: Extended commentary to provide educators with a greater understanding of each of the frameworks, approaches, and phases and levels. Teachers' Editions are 20–30 pages and more explanatory than the Handbooks.

Besides the learning resources needed for the training itself, we developed user-friendly research instruments for data collection:

- Participant research instruments: Pre- and post-module surveys (quantitative and qualitative questions), personal logs for each module, module assessments, and an end-of-programme commitment survey.
- Researchers' qualitative observations: Trainers recorded their observations of each module at each school, covering educators' participation, engagement, in-session activities; responsed to reflection questions and prompts, and other interesting and relevant data; and generated reflections on the overall training experience post-training.

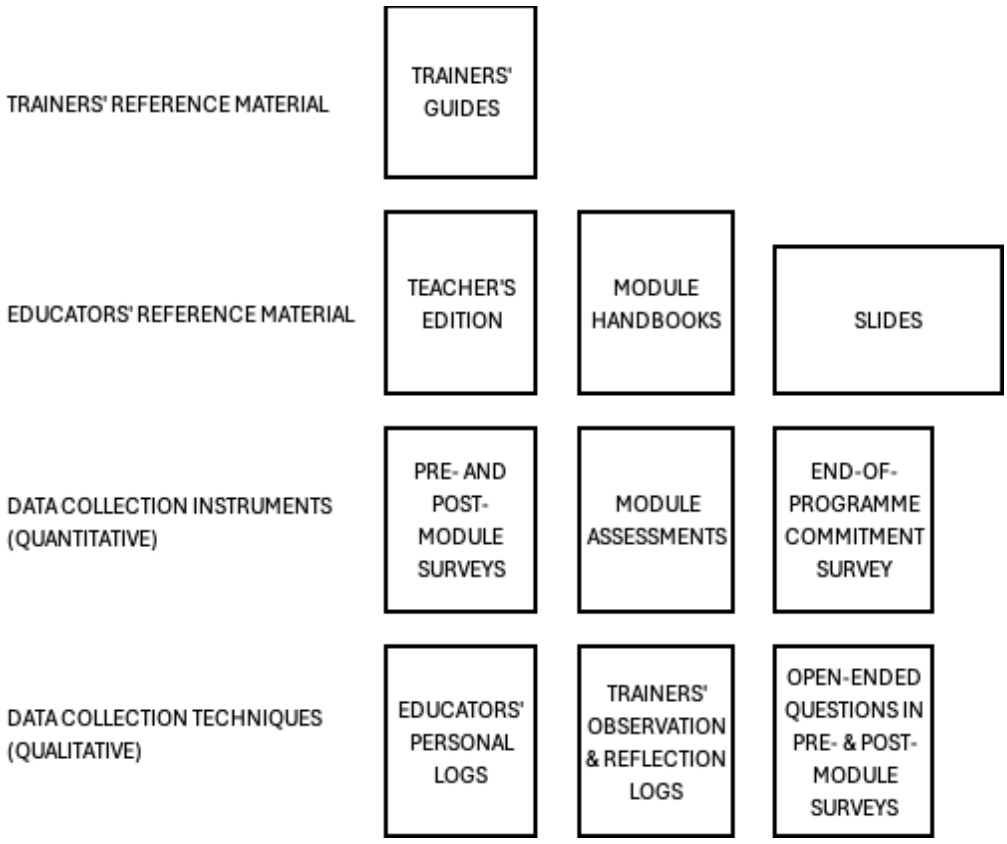


FIGURE 4: Training resources and data collection instruments developed

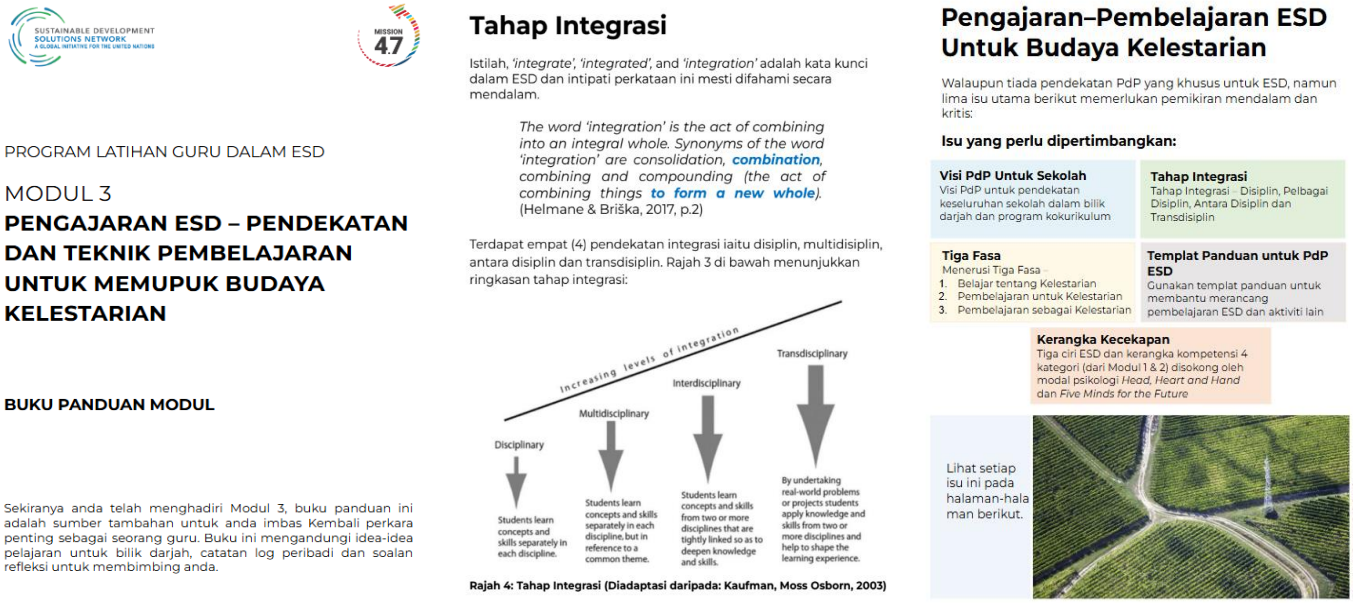


FIGURE 5: Example pages from a Module Handbook

2.3.5 Localisation

The team localised ESD frameworks and content to tailor the training to Malaysia's education context. This included:

- Selecting case studies from Malaysian examples.
- Developing participant resource materials and research data collection instruments in Bahasa Malaysia.
- Distilling key ideas from global education development frameworks, such as the Education 2030 Incheon Declaration and Framework for Action, UNESCO's ESD For 2030, and the GEP.
- Adopting a school-by-school approach to harness change-makers at the school level, leaving no individual educator bereft of post-training peer and leadership support.

3

EXECUTING THE INTERVENTION

3.1 Participating Schools

In preparation for the pilot phase of the ESD Educator Training Programme, the research team set about identifying suitable schools with the help of the Education Policy, Planning, and Research Division (EPRD) of the Ministry of Education, which recommended a group of both primary and secondary schools from diverse geographical settings, including urban, suburban, and rural areas. By incorporating schools from varied contexts, the programme could address distinct needs of each, enhancing the relevance and applicability of the training.

The team then conducted engagement sessions with the school leaders to introduce the programme's objectives, content, expectations, necessary commitment, and anticipated outcomes. These meetings were critical to fostering a shared understanding and alignment between the project team and the schools. Schools were then presented with scheduling options to accommodate their timetables.

School	Description[8]
SMK St Mary, Kuala Lumpur	Total number of educators: 66 Total number of students: 1106 SMK St Mary, Kuala Lumpur—known widely as St. Mary's School—is an all-girls secondary school that is among Malaysia's many historic former Mission schools. It was established in 1912 by British Anglican missionaries in the heart of Kuala Lumpur, and was later relocated to the fringes of the city in Taman Intan Baiduri, Selayang.
SMK Pedas, Negeri Sembilan	Total number of educators: 49 Total number of students: 451 SMK Pedas, located in the rural town of Pedas within Negeri Sembilan's Rembau district, is a secondary school established to serve the educational needs of Pedas and its surrounding areas. Initially founded with modest facilities, SMK Pedas has gradually expanded to accommodate a larger student body.

[8] All school data is as of 30 December 2024.

SMK Dato Harun, Tanjung Karang, Selangor	Total number of educators: 84 Total number of students: 678 SMK Dato Harun is a secondary school located in Tanjung Karang, a coastal town in the Kuala Selangor district of Selangor, located in a rural, agricultural region known for rice farming and coastal activities.
SK Putrajaya Presint 18(1), Putrajaya	Total number of educators: 152 Total number of students: 2400 Established in 2008, SK Putrajaya Presint 18(1) is a primary school located in Malaysia's federal administrative capital, Putrajaya, to serve the educational needs of the Putrajaya population, made up predominantly of civil servants. It also includes a Special Needs Programme.
Komplex Sekolah Wawasan (Vision School Complex) USJ 15, Subang Jaya, Selangor	
The Vision School Complex located in USJ 15, Subang Jaya, was established with the objective of fostering unity and mutual understanding among the country's diverse ethnic communities by creating a cluster of the three types of national schools—Malay medium, Chinese vernacular, and Tamil vernacular—in one complex. Its objective is to encourage students from different ethnic backgrounds to intermingle and engage in joint activities to promote values of respect, unity and collaboration from an early age. The schools in this cluster are: SK Dato' Onn Jaafar, SJK (T) Tun Sambanthan, and SJK (C) Tun Tan Cheng Lock.	
SK Dato' Onn Jaafar	Total number of educators: 45 Total number of students: 673 SK Dato' Onn Jaafar is a national primary school in the Vision School Complex in USJ 15. This school uses Bahasa Malaysia as the primary medium of instruction in all teaching and learning activities.
SJK (T) Tun Sambanthan	Total number of educators: 37 Total number of students: 571 SJK (T) Tun Sambanthan is a Tamil vernacular national-type school within the Vision School Complex in USJ 15. The school emphasises the use of Tamil as the primary medium of instruction across all subjects, except for language-specific classes, fostering linguistic and cultural heritage.
SJK (C) Tun Tan Cheng Lock	Total number of educators: 43 Total number of students: 882 SJK (C) Tun Tan Cheng Lock is a Chinese vernacular national-type school within the Vision School Complex in USJ 15. The school uses Mandarin as the primary medium of instruction for all subjects except for language-specific classes.

TABLE 2: Profile of schools that participated in the pilot programme

3.2 Modality and Unique Features of Delivery

3.2.1. Pre-training engagement

Prior to training, the programme team visited each school to share all programme information with school leaders and teachers, including an overview of the programme, its objectives, format, and the commitment requirement of all educators as pilot participants. This pre-training engagement provided the opportunity for educators to provide their opinions of the programme and ask clarification questions; and allowed the programme team to secure buy-in and commitment before the programme starts. It also served as a two-way logistics discussion to align expectations on timing, training venues, and refreshments. For example, a policy of no single-use plastics and disposables for refreshments was made clear.

3.2.2. Whole-school training

The ESD Educator Training Programme was structured to equip educators with comprehensive resources and adaptable methodologies to seamlessly integrate ESD into their daily teaching practices. Prioritising accessibility and inclusivity, the programme adopts a whole-school training model to ensure that all educators within a school ecosystem benefit from shared knowledge and unified strategies. This model represents a significant shift from traditional training methods that typically involve only one or two representatives from each school, with the expectation that they will transfer their acquired knowledge to colleagues. Our initial study revealed that this approach often failed to achieve sustained impact, with representative teachers lacking the time, necessary skills, or interest to cascade what they learned during training.

The whole-school model, wherein all educators actively participate in the training, fosters a collaborative learning environment and ensures the principles of ESD are comprehensively understood and embraced by the entire faculty, promoting a cohesive and integrated approach to sustainability across the school community, and an environment of continuous improvement and peer support.

3.2.3. Modular approach with strategic gaps

The ESD Educator Training Programme adopts a modular approach, initially structured into five three-hour sessions, with a minimum one-week interval between them. This intentional spacing is integral to the programme's design, as it provides valuable opportunities for educators to implement what was learnt during training. By applying ESD strategies in their classrooms, educators can observe the impact on student learning and refine their approach. Practical application also allows educators to make specific observations that they can share with colleagues during subsequent modules. These intervals allow time for reflection, application and experimentation, and peer to peer sharing, reinforcing a continuous learning cycle. Each module was also crafted to build on previous content, ensuring that educators can fully internalise each concept before moving on to the next.

3.2.4. Integrating ESD seamlessly into the existing syllabus

The ESD Educator Training Programme was developed with a clear understanding of the significant workload already borne by educators, which includes not only teaching but also substantial administrative responsibilities. Recognising these challenges, the programme team prioritised creating modules that align seamlessly with educators' existing duties rather than adding to their burden.

To achieve this, the programme presents ESD not as additional lessons, but as something that can be integrated into their current syllabi, and in so doing, also enhance the relevance and relatability of lessons. This design supports educators in managing their workload and fosters a holistic learning environment where critical sustainability concepts become an inherent part of the day-to-day educational experience.

3.2.5. Using local cases and examples for deeper understanding

Despite the availability of generic ESD materials created by international experts, the implementation of ESD cannot be "one-size-fits-all." The diverse needs, cultures, and challenges of different countries, communities, and individuals mean that resources must be adapted with locally relevant content to create a meaningful and relatable learning experience.

The ESD Educator Training Programme incorporates local examples, allowing educators to connect global concepts with the realities of their communities, and supports them in exploring practical solutions to local challenges. This approach strengthens engagement and understanding and ensures that the ESD lessons resonate more deeply with both educators and learners. Local examples make complex or abstract ESD concepts more interesting and easier to understand. By highlighting how sustainable practices can address specific local issues—such as poverty, food systems, waste management, or biodiversity preservation – educators can see immediate relevance and are more likely to feel invested in the goals of the ESD programme and internalise its principles.

3.2.6. Hands-on activities

The ESD Educator Training Programme goes beyond traditional lecture-based methods, adopting an experiential learning model that immerses educators in activities where they can apply ESD principles. This dynamic approach not only makes the sessions engaging but also allows educators to adapt and replicate the new approaches learnt in their day-to-day teaching practices (i.e., lessons, project-based learning activities, and student-led initiatives). This enriches the classroom experience and reinforces sustainability concepts in a practical, impactful way. With practice, educators stand to increase their confidence in making ESD a lifelong, actionable commitment, instead of a set of abstract concepts.

3.2.7. Working collaboratively

The learning space is structured in an island-style format to encourage interaction and engagement for collaborative learning. Educators are strategically seated in preassigned, mixed groups to ensure representation from various disciplines within each group. This arrangement fosters interdisciplinary and transdisciplinary discussions, enabling diverse perspectives and innovative ideas to emerge. By facilitating such collaboration, the programme enhances mutual understanding among educators, contributing to a more collaborative teaching and learning environment in the schools.

3.2.8. Freedom, independence, and creativity

The programme employs a non-prescriptive facilitation approach, encouraging educators to actively engage with the learning materials. Learning activity formats are deliberately kept open-ended, allowing educators the freedom to explore, interpret, and contribute their ideas to the module. This approach stimulates creativity, enabling participants to develop unique solutions and perspectives without being influenced by biases or preconceived opinions. Such a method fosters independent thinking and innovative problem-solving.

3.2.9. Concept reinforcement across modules

Through the modules, educators are introduced to specific ESD frameworks, including the Eight Principles of the Sustainability Literacy Mindset, the Four Pillars of Sustainable Development, and ESD Characteristics and Competencies. These frameworks are systematically applied throughout subsequent training modules, creating repeated opportunities for educators to engage with new material in practical, hands-on ways. Consistent use of these frameworks reinforces understanding and mastery, empowering educators to internalise and apply ESD principles effectively in their schools.

3.2.10. Surveys and logs for data-driven outcome tracking and programme improvement

Pre-module surveys establish a baseline of educators' initial understanding of and attitudes towards ESD. Post-module surveys then capture changes in understanding, attitudes, and confidence levels, providing measurable data on their takeaway.

Personal logs enable educators to document their experiences, insights, and challenges as they progress through each module and apply learning in their classrooms. This reflective practice fosters a more profound, personal connection with ESD principles, encouraging educators to internalise their learning, experiment with new approaches, and critically evaluate outcomes. In turn, this promotes long-term professional and personal growth, better learning outcomes for students, and positive changes within the school that are in line with future-relevant ESD competencies.

The surveys and logs also allow facilitators to use an evidence-based approach to analyse trends, assess programme outcomes, and enable programme enhancement and targeted support.

3.3 Research methodology

3.3.1. Data collection

The study employed a concurrent mixed-methods design. Quantitative and qualitative data were collected simultaneously.

Quantitative data was collected via pre- and post-module surveys (for each of the four modules), three assessments, and one end-of-programme survey. Qualitative data was collected from trainers' observation and reflection logs, open-ended questions within the pre- and post-module surveys, and educators' personal logs.

3.3.2. Sample

The sample involved in the quantitative part of the study shown in Table 3 highlights the sample size (n) for the data collected in the surveys.

No.	Instrument	School	Sample Size (n)	Total
1	Pre-Module 1 Survey	St. Mary's	47	
		SMK Pedas	33	
		SK Putrajaya Presint 18	84	
		SMK Dato' Harun	19	301
		SK Dato' Onn Jaafar	38	
		SK Tun Tan Cheng Lock	49	
		SK Tun Sambanthan	31	
2	Post-Module 1 Survey	St. Mary's	10	
		SMK Pedas	8	
		SK Putrajaya Presint 18	8	
		SMK Dato' Harun	7	58
		SK Dato' Onn Jaafar	10	
		SK Tun Tan Cheng Lock	13	
		SK Tun Sambanthan	2	
3	Pre-Module 2 Survey	St. Mary's	29	
		SMK Pedas	16	
		SK Putrajaya Presint 18	2	
		SMK Dato' Harun	16	95
		SK Dato' Onn Jaafar	18	
		SK Tun Tan Cheng Lock	9	
		SK Tun Sambanthan	5	
4	Post-Module 2 Survey	St. Mary's	4	
		SMK Pedas	3	
		SK Putrajaya Presint 18	1	
		SMK Dato' Harun	4	47
		SK Dato' Onn Jaafar	2	
		SK Tun Tan Cheng Lock	21	
		SK Tun Sambanthan	12	
5	Pre-Module 3 Survey	St. Mary's	13	
		SMK Pedas	23	
		SK Putrajaya Presint 18	8	90
		SMK Dato' Harun	17	
		SK Dato' Onn Jaafar	1	
		SK Tun Tan Cheng Lock	26	
		SK Tun Sambanthan	2	
6	Post-Module 3 Survey	St. Mary's	0	
		SMK Pedas	7	
		SK Putrajaya Presint 18	0	
		SMK Dato' Harun	1	37
		SK Dato' Onn Jaafar	1	
		SK Tun Tan Cheng Lock	3	
		SK Tun Sambanthan	25	

7	Pre-Module 4 Survey	St. Mary's	11	
		SMK Pedas	1	
		SK Putrajaya Presint 18	0	22
		SMK Dato' Harun	2	
		SK Dato' Onn Jaafar	0	
		SK Tun Tan Cheng Lock	6	
		SK Tun Sambanthan	2	
8	Post-Module 4 Survey	St. Mary's	4	
		SMK Pedas	2	
		SK Putrajaya Presint 18	0	
		SMK Dato' Harun	0	32
		SK Dato' Onn Jaafar	1	
		SK Tun Tan Cheng Lock	0	
		SK Tun Sambanthan	25	

TABLE 3: Sample involved in pre- and post-module surveys

**Table 3 shows the decline in the number of respondents in the pre- and post-module surveys over time.*

3.3.3. Quantitative data

Pre- and post-module surveys

The pre- and post-module surveys investigated the self-evaluated perceptions of educators for different constructs identified according to the objectives put forward in the study. (See Section 1.4.) The constructs are shown in Table 4.

No.	Module	Study Objective	Constructs Measured
1	Pre and Post Modules 1	To foster change towards a sustainable mindset among educators	ESD concepts ● Familiarity with ESD Terminologies ● The 4 SD pillars ● Sustainability Literacy
2	Pre and Post Modules 2	To familiarise teachers with the core ESD competencies	ESD core competencies ● Learning to Know ● Learning to Live Together ● Learning to Be ● Learning to Do

3	Pre and Post Modules 3	To equip teachers with transformative pedagogies for the execution of ESD (Focused on the interconnectedness of knowledge and skills)	Pedagogical Approaches ● Disciplinary Approach for Knowledge Learning ● Multidisciplinary Approach for Knowledge Learning and Behavioural Change ● Interdisciplinary and Transdisciplinary Approaches for Knowledge Learning Values Infusion and Behavioural Change
4	Pre and Post Modules 4	To equip teachers with transformative pedagogies for the execution of ESD (Focused on partnerships and collaboration in teaching and learning)	Collaboration ● Effect from in and around the School Community Collaboration ● Effect from National and International Collaboration ● Effect of Collaboration on Teachers ● Effect of Collaboration on Students

TABLE 4: Pre- and post-module surveys' objectives and constructs measured

Module assessments

There were also three module assessments. The Module 1 assessment was designed to gather the perceptions of educators related to SD mindsets at the end of Module 1. The Module 2 assessment was related to educators' ESD competencies. The Module 3 assessment focused on transformative pedagogies. Each module assessment had ten questions, and there were no right or wrong answers. Educators were asked to make a judgment as to the "best" answer.

End-of-Programme commitment survey

In addition, an "End-of-Programme Commitment Survey" questionnaire was administered at the end of the programme. Its objective was to assess: i) the extent to which educators commit to altering their teaching approaches by applying what they learnt during the training, and ii) the willingness of educators to be part of a team to effect school-wide changes in line with ESD principles. 145 responses were collected.

3.3.4. Qualitative data

Personal logs at the end of each module

Educators were asked to reflect on a number of questions at the conclusion of each module. At the end of Module 1, four (4) questions; five (5) questions at the end of Module 2; four (4) questions at the end of Module 3; and two (2) questions at the end of Module 4.

Personal logs focused on gathering educators' thinking processes as they incorporated elements from the module. They were asked how they made use of their learning, what they tried, and the challenges they

faced. Unlike the survey questions which focused on perspectives, these were focused on educators' reflections upon their practice.

Trainers' observations and reflections

The programme team recorded detailed observations at the end of each training session. Five observers recorded a total of 54 observations throughout the programme. The trainers kept a log throughout the training called "Trainers' Reflections Across Sessions."

Open ended questions in pre- and post-module surveys

To elicit the educators' perspectives towards each module's key elements, each pre- and post-module survey contained open-ended questions: four (4) open-ended questions were given in the pre- and post-Module 1 surveys; seven (7) open-ended questions in the pre- and post-Module 2 surveys; two (2) open-ended questions in the pre- and post-Module 3 surveys; and four (4) open-ended questions in the pre- and post-Module 4 surveys.

3.4 Analysis

This section explains the process of analysis in the study.

3.4.1 Quantitative data analysis

Table 2 shows that the sample for individual schools was small. This situation therefore only allowed for overall data analysis of all schools.

Analysis of pre- and post-module surveys

The overall means for the Likert scale data and the standard deviation (SD) values were calculated for all the pre and post surveys. The mean difference—or, more accurately, the difference between the pre and post survey means (MD)—was calculated. The intervention effect is a difference in means.

The MD is a standard statistic that measures the absolute difference between the mean value in two groups in an intervention. It estimates the amount by which the intervention changes the outcome on average at the end compared with the beginning. Based on the MD and the SD, the standard mean difference (SMD) was determined. The standardised mean difference expresses the size of the intervention effect in a study relative to the variability observed in that study. The interpretation of SMD values is found in Table 5.

SMD values	Intervention Effects
0.01	Very Small
0.2	Small
0.5	Medium
0.8	Large

TABLE 5: Interpretation of SMD values
(Source: Sawilowsky, 2009; Funder, & Ozer, 2019)

Analysis of module assessments

As educators in the programme were asked to select the "best" answer to assessment questions (there were no right or wrong answers), the answers for each question were analysed using percentages. The results of the module assessments complement the pre- and post-module survey results.

Reliability of quantitative instruments

Cronbach's alpha coefficient, which measures the internal consistency, or reliability, of a set of survey items, was used in the study to determine the reliability of the surveys. The reliability of the surveys is given in Table 6.

Survey	Alpha
Pre-Module 1 Survey	0.941
Post-Module 1 Survey	0.947
Pre-Module 2 Survey	0.938
Post-Module 2 Survey	0.946
Pre-Module 3 Survey	0.828
Post-Module 3 Survey	0.933
Pre-Module 4 Survey	0.965
Post-Module 4 Survey	0.987

All Cronbach's alpha values are above 0.7. Therefore, the instruments are reliable.

TABLE 6: Reliability of the surveys

3.4.2. Qualitative data analysis

The constant comparative method introduced by Glaser and Strauss (1967) was applied to analyse the substantive qualitative data using pre-determined and emergent themes. Predetermined codes were determined at the start of the analysis process. The qualitative data from all instruments were extracted, organised, and shared with all the researchers.

Analysis of qualitative data

The process involved repeated reading of the data and constant comparing across the data sources to identify early emerging codes. These early codes were then further scrutinised and collapsed into themes.

The research team conducted peer review sessions (Table 7) to obtain consensus for the final themes.

No.	Session	Number of Persons Involved	Description
1	30 December 2024	7	The qualitative data collected and organised from the instruments into initial codes were reviewed and discussed in depth.
2	24 January 2025	7	An in-depth follow-up brain-storming peer debriefing discussion till saturation was conducted to reduce the initial codes into emergent categories.
3	20 February 2025	5	The final peer debriefing session to come to a consensus by all about the themes and finalised.

TABLE 7: Peer debriefing sessions

Credibility and trustworthiness of qualitative data

Records of qualitative data were meticulously kept and organised to ensure a clear audit trail. The research team conducted constant comparison and triangulation between different data sources. Peer debriefing ensured in-depth discussion between researchers to clearly identify and describe mutually exclusive themes.

4

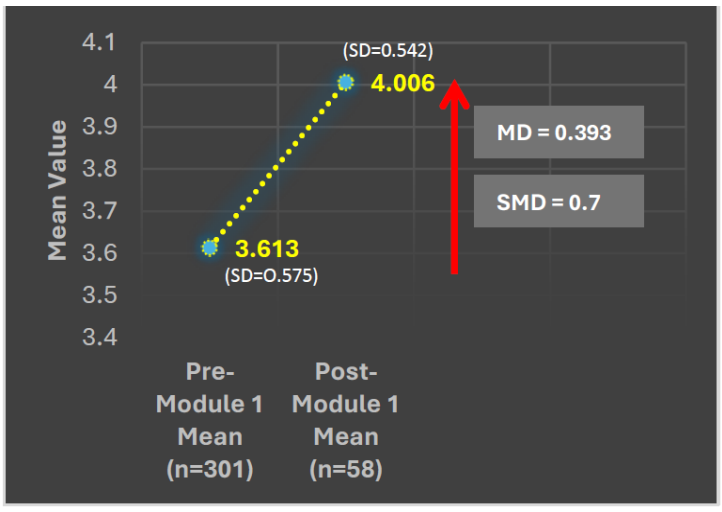
INTERVENTION EFFECTS

This chapter discusses the intervention effects of the pilot ESD Educator Training Programme based on the quantitative findings and complemented by qualitative data.

The main statistical measurements calculated are the difference in the means (mean difference, MD) and the standard mean difference (SMD). The MD measures the absolute difference between the mean values in an intervention. The SMD expresses the size of the intervention effect in a study relative to the variability observed in that study. The rule of thumb used for the size range of intervention effects in the present study is defined as SMD (0.01) = very small, SMD (0.2) = small, SMD (0.5) = medium, SMD (0.8) = large. The result for each objective is discussed in turn.

4.1 Objective 1: To Foster Change by Cultivating a Sustainable Development Mindset among Educators

The first objective of the study, to foster change by cultivating a sustainable development mindset among educators, was addressed in Module 1. In this module, educators were exposed to terminologies and common development principles of sustainability. The Pre-Module 1 and Post-Module 1 surveys elicited educators' self-evaluated perceptions. Figure 6 shows the overall means of Pre- and Post-Module 1 surveys, the difference in means (MD), and the Standardised Mean Difference (SMD).



The post-Module 1 **mean score was higher by average**. The difference in the means **(MD) was 0.393**.

The standardised mean difference **(SMD) was 0.7**, indicating a medium size intervention effect of the module.

The results infer increased familiarisation towards the common terminologies and principles of sustainability.

FIGURE 6: Overall means of educators' self-evaluation of familiarity with sustainable development

For a deeper analysis, the Pre- and Post-Module 1 survey items were grouped into the constructs (a) Familiarity with ESD Terminologies, (b) The 4 SD pillars, and (c) Sustainability Literacy. Figure 7 shows the results for the means of these constructs from the Pre-Module 1 and Post-Module 1 surveys.

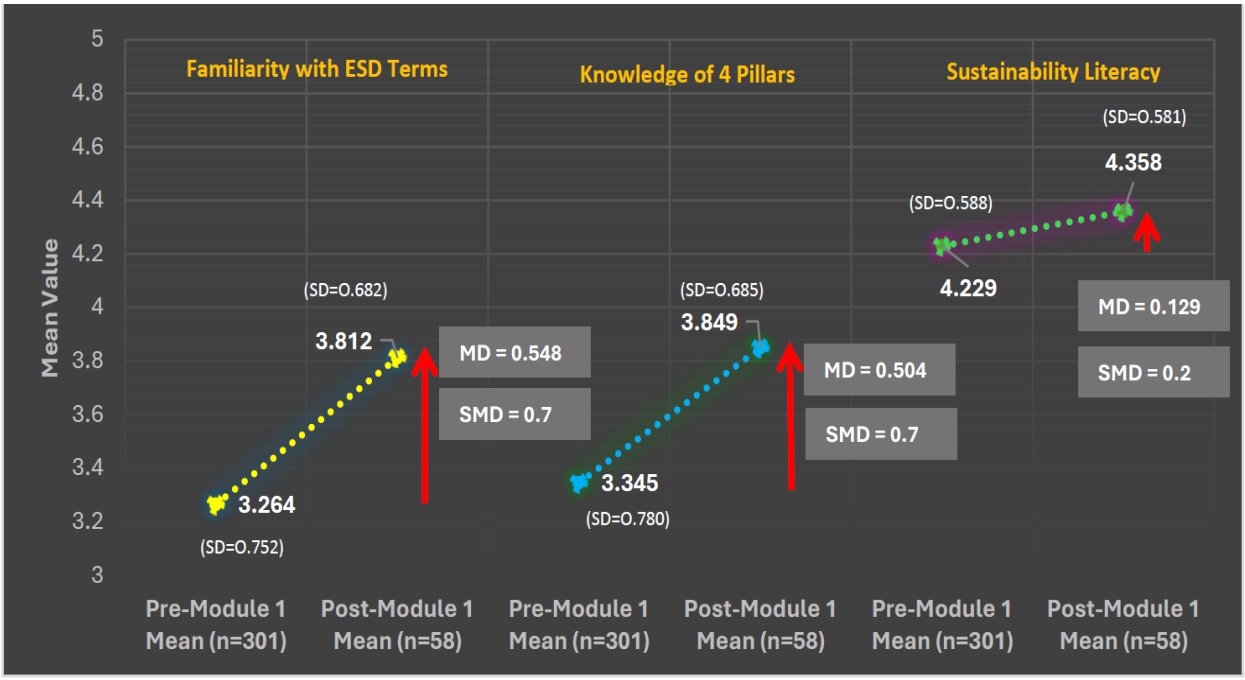


FIGURE 7: Educators' self-evaluation of the three constructs for pre- and post-Module 1 surveys

To further complement the data, the results of the Module 1 Assessment (which was administered after completion of Module 1, before the start of Module 2) are given below. Educators responded to statements given to them. The answers were found to be spread out in a spectrum, from "Has not acquired a SD mindset" to "SD inclined mindset." Table 8 shows the results from the Module 1 Assessment.

	Nil / Low SD Mindset		Has Acquired an SD Mindset
Statement	Has Not Acquired a SD Mindset (%)	Moving Towards a SD Mindset (%)	SD Inclined Mindset (%)
Having a sustainability mindset means…?	17.5 To ensure that first our homes are clean, and we do not collect unnecessary rubbish.	49.4 To be able to explore within ourselves our personal values and beliefs to gain control over our own actions.	29.9 The "lens" through which an individual views the challenges faced by our planet.

Statement	Has Not Acquired a SD Mindset (%)	Moving Towards a SD Mindset (%)	SD Inclined Mindset (%)
Every minute 1 million plastic bottles are thrown away globally. Do you think that by 2050 there will be more plastic in the oceans than fish?	20.1 Definitely yes	72.1 Maybe. It depends upon how humans accept and understand the sustainability mindset.	7.1 No. Humans will be more sustainability minded by 2050.
Attitudes and behavior of Malaysians towards the environment depends upon values and beliefs of the individual. What is your opinion?	5.2 I do not think values have an effect on the pro-sustainability behavior.	27.9 If the individual has egoistic and hedonistic values, the person will not exhibit pro-sustainability behavior.	66.9 If the individual has biospheric and altruistic values, the person will exhibit pro-sustainability behavior.
There are 4 sustainability pillars, namely, environmental sustainability, economic sustainability, social sustainability, and cultural sustainability. In your opinion, is the present climate change challenge related to all the four pillars?	5.2 No	85.7 Maybe/Not sure	7.1 Yes
Malaysia still contributes to climate change. What is your opinion?	3.9 No	90.3 Maybe / Not sure	9 Yes

TABLE 8: Self-evaluated perceptions of respondents related to sustainability mindsets from Module 1 assessment (n=154)

The percentages show that participants can be seen moving towards acquiring a SD mindset (yellow column). A lower percentage of educators acquired an SD mindset (blue column). Overall, the educators' perceptions point to positive elements towards a sustainability mindset.

4.1.1. Objective 1 Qualitative Insight

In the Module 1 Personal Log, participants were asked to elaborate on the sustainability mindsets they exhibit. Selected answers are shown in Table 9. The qualitative findings show that, as in the quantitative findings, educators are moving towards a sustainable development mindset. However, the ideas can be considered surface-level.

Has Not Acquired a SD Mindset	Moving Towards a SD Mindset	SD-Inclined Mindset
Responses are general*	Responses indicate some context of practice*	Responses indicate specific context of practice*
Care for the environment *Care for the earth* *Through recycling programmes* *Collecting recyclables* *A clean natural environment* *Responsibility & conservation* *Separate waste* *Usage of renewable sources, climate change*	*The importance of taking care of the ecosystem balance* *Teaching the importance of nature and the consequences if not preserved* *Preserve existing resources and renew depleted resources* *Avoid wasting, and ways to save electricity, as well as future consequences* *Try using our own food and drink containers when purchasing food.*	*Every action we take every day has an impact on our environment.* *Categorise house waste into recyclable and non-recyclable waste. Use less tissue (use cloth). Save electricity. Save water. No polystyrene.* *Practice recycling, composting, and reduce usage of one-time-use plastic. I also strive to buy products with minimal packaging and which can be recycled.* *Take responsibility to reduce pollution, deforestation, and resource wastage.*

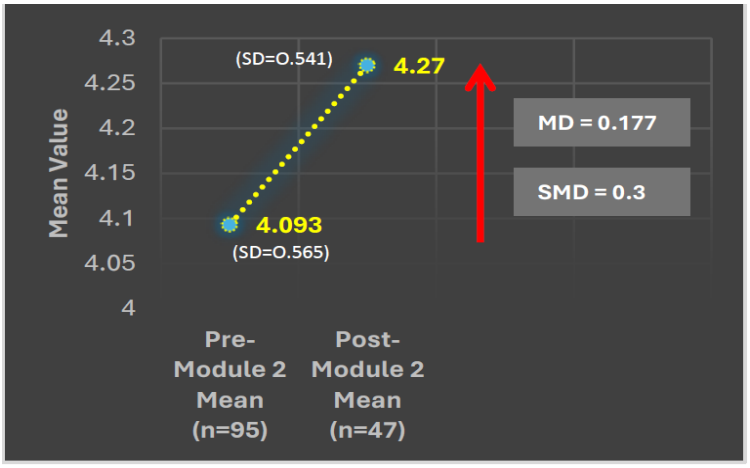
TABLE 9: Personal Log after Module 1, Reflection 4 responses on sustainability mindsets

**The excerpts have been translated from Bahasa Malaysia. The original excerpts are in Appendix A.*

It can be concluded that, overall, Module 1 has contributed to fostering change among pilot participants towards being more familiar with the ESD terminologies, the 4 ESD pillars, and sustainability literacy.

4.2 Objective 2: To Familiarise Educators with the Core ESD Competencies

The second objective of the pilot was to familiarise educators with the Core ESD Competencies. This was addressed in Module 2. The Pre- and Post-Module 2 surveys elicited self-evaluated perceptions from educators. Graph 3 shows the overall means of Pre- and Post-Modules 2 surveys. The MD and SMD values were also determined.



The Post-Module 2 **mean score was higher by average**. The difference in the means **(MD) was 0.177.**

The **SMD was 0.3**, which indicated an overall small size intervention effect of Module 2.

FIGURE 8: Overall means of educators' self-evaluation of core ESD competencies

Hence, the results indicate that the participants have acquired knowledge of the ESD competencies.

The items of the Pre- and Post-Module 2 surveys were grouped into the four component competencies—Learning to Know, Learning to Live Together, Learning to Be, and Learning to Do—for a deeper level of analysis. The means for these constructs in Pre- and Post-Module surveys are given in Figure 9.

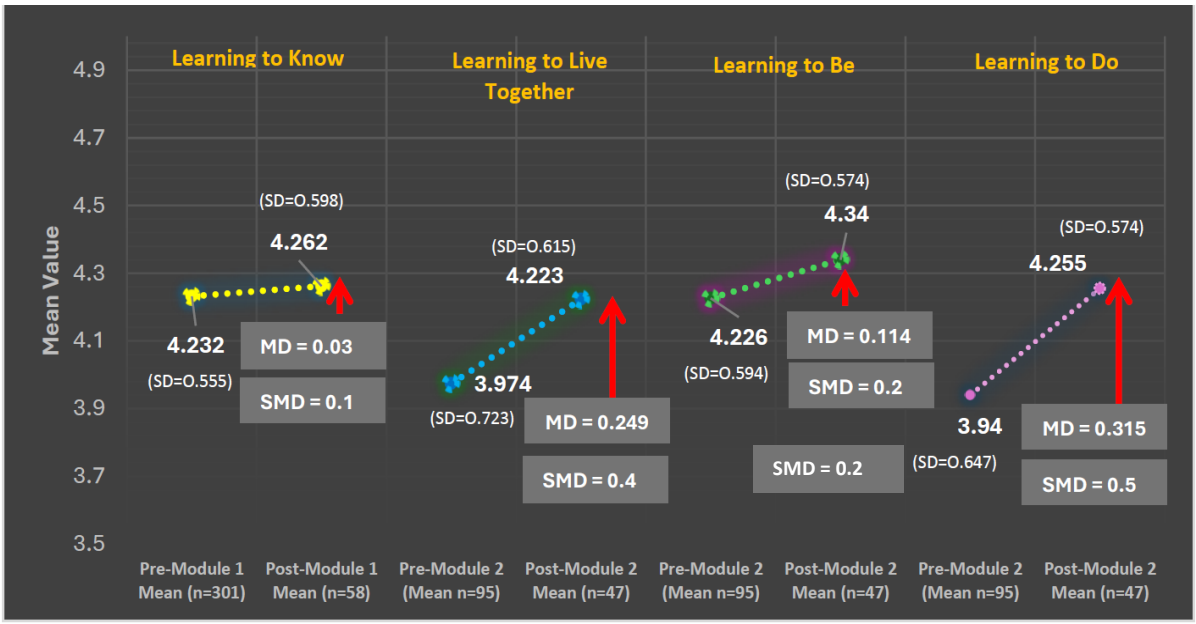


FIGURE 9: Educators' self-evaluation of the four constructs for pre- and post- Module 2 surveys

The Post-Module 2 mean score was higher by average for all four constructs (Learning to Know, 0.03; Learning to Live Together, 0.249; Learning to Be, 0.114; Learning to Do, 0.315). The SMD of the competencies Learning to Know was 0.1 and Learning to Be was 0.2, which is a small size intervention effect. The SMD of Learning to Live Together was 0.4 and Learning to Do was 0.5, which indicates a higher medium size intervention effect.

Results from the Module 2 Assessment, which was administered at the end of Module 2, support the above results, as shown in Table 10.

Core Competency	Number of educators who chose their most important competency	Percentage (%) of educators who chose their most important competency
Learning to Know	27	14.8
Learning to Live Together	76	41.5
Learning to Be	30	16.4
Learning to Do	50	27.3
Total	183	100%

TABLE 10: The Importance of the 4 Core Competencies as perceived by educators (n=183)

Educators selected **"Learning to Live Together" (41.5%)** and **"Learning to Do" (27.3%)** as the more important core competencies. This coordinates with the Pre- and Post-Module 2 results.

4.2.1 Objective 2 Qualitative Insight

The 4 Core Competencies investigated in the pilot study are defined as:

Learning to Know: to understand the challenges facing society (both locally and globally) today and envision the potential evolving role of educators and learners to meet what the future may bring.

Learning to Live Together: to contribute to the development of partnerships and an appreciation of interdependence, pluralism, mutual understanding and peace which can transform their classrooms and help students envision alternative futures.

Learning to Be: to develop one's personal attributes and ability to act with greater autonomy, judgement and personal responsibility in relation to sustainable development, to transform themselves as a ESD educator to challenge and lead their students into the future.

Learning to Do: to develop practical skills and action competence in relation for transformative education for sustainable development to prepare students for the future.

Qualitative data provides a little more depth as to how educators understand the core ESD competencies after being exposed to Module 2 (Table 11).

Competency: Learning to Know (Sample Excerpts*)	Explanation
The consequences of mercury pollution were catastrophic. Fish-eating birds, such as seabirds and raptors, experienced population declines, symbolised by the eerie silence as birds stopped singing. Meanwhile, the local human population suffered from severe health effects, including neurological disorders, birth defects, and deaths. (Overall Feedback after Module 2)	Knowing about sustainable development and the related topics and challenges. For example, the interconnectedness between human industry, environmental and human health.
With knowledge about the local circumstances, teachers can give practical examples which are more relevant and help students see the linkages between global concepts and local issues (Post-Module 2 Survey, Open-ended Question 4)	The practice of ESD in the local, national, and global contexts. For example, educators realise the relevance of knowing local knowledge to their own teaching practice.
This education is not only about scientific understanding of the environment but also about ethical values, such as empathy for future generations and responsibility towards communities that are less fortunate. (Post-Module 3 Survey, Open-ended Question 2)	Knowing that ESD must take an integrative view of the key issues and challenges by considering social, ecological, economic, and cultural dimensions of sustainable development.
Competency: Learning to Live Together (Sample Excerpts*)	**Explanation**
Yes, it will succeed—Projects like this not only attract students' interest but also encourage their active participation. *Example: A school garden is a physical space that students can see and tend to every day, which helps them witness the results of their hard work in entirety.* (Post-Module 2 Survey, Open-ended Question 7)	Identifying local learning opportunities related to sustainable development and building collaborative relationships in living together.
We all need to play our part in caring for and protecting it. This includes adopting a more sustainable lifestyle, such as reducing plastic usage, recycling, minimising waste, and supporting policies and laws that support environmental conservation. (Personal Log after Module 2, Reflection 1b)	Realising that everyone must reflect and take responsibility for their actions.

Competency: Learning to Be (Sample Excerpts*)	Explanation
I need to be more mindful and confident in setting the mindset and executing what I've learned. Embrace sustainability practices, say no to plastic bags. It has to start with me before I can change students' mindsets. (Personal Log after Module 2, Question 4 Overall Feedback)	Realisation of the need to dwell upon the ways in which cultural diversity, gender equality, social justice, environmental protection, and personal development are integral elements of ESD and ESD educational processes.
I now realise that many citizens, including many teachers, are neither well-informed nor concerned about the issues above. Some blame foreign workers, others believe that we are already well-educated on the matter, and some simply do not care about these issues above at all. (Post-Module 1 Survey, Open-ended Question 4)	The need to empathise, think of others, and to be aware of what underpins our own actions.
Competency: Learning to Do (Sample Excerpts*)	**Explanation**
Yes, because the integration of subjects can provide many inputs for teachers and students, as well as relating it to everyday life. (Post-Module 2 Survey, Open-ended Question 7)	Practise an action-oriented transformative pedagogy that engages learners in participative, creative, and innovative thinking processes in the context of local communities and learners' daily lives.
I need to be more mindful and confident in setting the mindset and executing what I've learned. Embrace sustainability practices, say no to plastic bags. It has to start with me before I can change students' mindsets. (Personal Log after Module 2, Question 4 Overall Feedback)	Function as a change agent within a process of organisational learning to advance the school towards sustainable development.

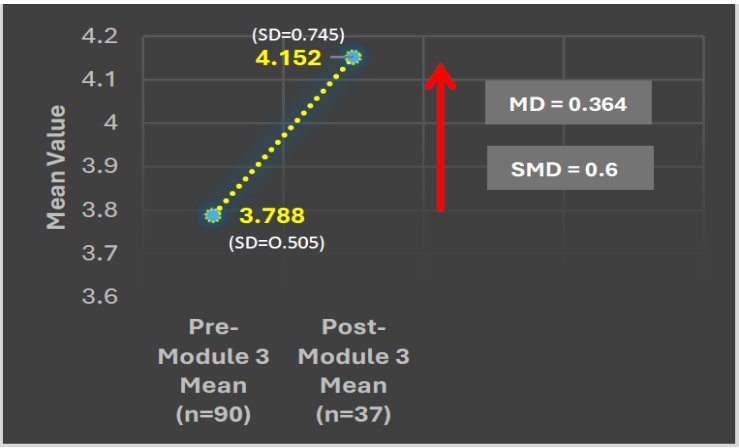
TABLE 11: Educators' qualitative answers related to the 4 Core Competencies

**The excerpts have been translated from Bahasa Malaysia. The original excerpts are in Appendix A.*

The results clearly suggest that Module 2 has raised awareness of all four categorisations of ESD competencies, albeit higher in "Learning to Live Together" and "Learning to Do" than in "Learning to Know" and "Learning to Be."

4.3 Objective 3: To Equip Educators with Transformative Pedagogies for the Execution of ESD

The third objective of the pilot addressed in Module 3 is to equip educators with knowledge of transformative pedagogies for the implementation of ESD. Figure 10 shows the overall means of Pre- and Post-Modules 3 surveys, which elicited educators' self-evaluation of their knowledge.



The Post-Module 3 **mean score was higher by average**. The **MD was 0.364.**

The **SMD was 0.6**, which indicated an overall medium size intervention effect of Module 3.

The results infer that the participant educators gained knowledge of transformative pedagogies to practice ESD through Module 3.

FIGURE 10: Overall means of educators' self-evaluation of knowledge of transformational pedagogies

For a more detailed analysis, the items of the Pre- and Post-Module 3 surveys were grouped into three main constructs: (a) (Mono)Disciplinary pedagogical approach for knowledge learning; (b) Multidisciplinary pedagogical approach for knowledge and behavioural change; and (c) Interdisciplinary/transdisciplinary pedagogical approach for knowledge, values infusion, and behavioural change. The means for the Pre- and Post-Module 3 surveys for these constructs are given in Figure 11.

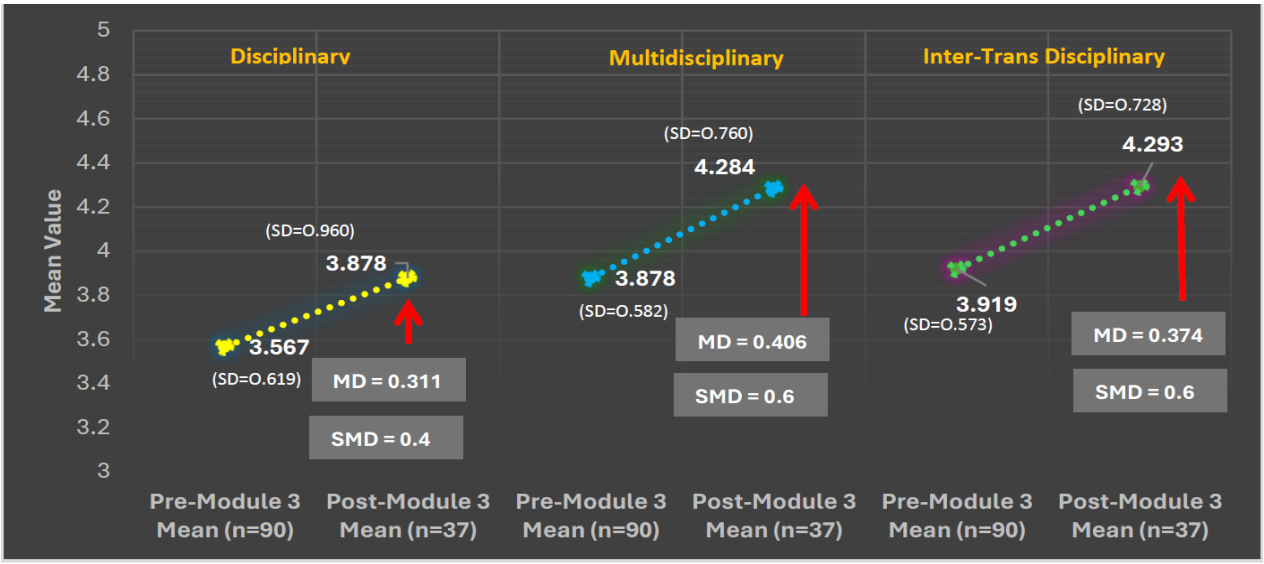


FIGURE 11: Educators' self-evaluation of the three pedagogical constructs for pre- and post- Module 3 surveys

The Post-Module 3 mean score was higher by average for all three constructs (**Disciplinary, 0.311; Multidisciplinary, 0.406; Inter/Transdisciplinary, 0.374).**
The SMD of all three constructs (**Disciplinary, 0.4; Multidisciplinary, 0.6; Inter/Transdisciplinary, 0.6)** indicated between a small and medium size intervention effect of Module 3.

The results indicate that participant educators have acquired greater understanding of transformative pedagogies. Results from the Module 3 Assessment reflect the above results, as shown in Table 12.

Pedagogical Constructs	Choice as the most effective for ESD (respondents)	Choice as the most effective for ESD (%)
Disciplinary & Multidisciplinary Approaches	31	18
Multidisciplinary & Interdisciplinary Approaches	67	39
Interdisciplinary Approach	14	8.1
Transdisciplinary Approach	60	34.9
Total	172	100

Educators selected a combination of **multidisciplinary - interdisciplinary** approaches and **transdisciplinary** approach as the most effective pedagogical constructs.

TABLE 12: The Effectiveness of the Pedagogical Constructs as perceived by educators (n=172)

4.3.1 Objective 3 Qualitative Insight

Participants found the multidisciplinary, interdisciplinary, and transdisciplinary approaches quite interesting and challenging as they conducted the activities. With more time, they would be able to grasp the usefulness of these approaches. The excerpt below* suggests that, as educators rush to complete the syllabus, time constraints prevent them from taking multi-/ inter-/ transdisciplinary approaches.

> *Planning cross-disciplinary teaching requires more time for collaboration, exchanging ideas, and developing lesson plans that support various subjects. Time constraints can be a major issue, especially when schedules are already packed. Differences in Teaching Styles: Each teacher may have a different approach to teaching, and adapting a suitable style for various subjects can be a challenge. Some teachers may prefer traditional methods, while others may be more open to creative or student-centred teaching.* (Personal Log, Module 3, Reflection)

Nevertheless, educators could see that this was a new and effective pedagogical strategy. In the post-Module 3 survey, participants could identify potential topics in their various subjects where they could try these approaches. For example*:

> *Malay Language with Art. Example: illustrating the waste cycle*
>
> *Conserving Nature in the Malay and Tamil languages*

One of the teachers listed several subjects and how they can be taught collaboratively. She wrote*:

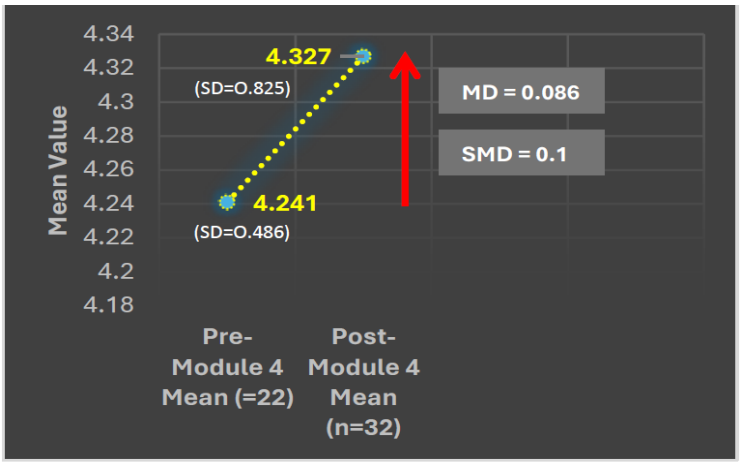
> *The Measures of Central Tendencies topic in the Form 2 Mathematics syllabus can be taught collaboratively with Science, History, Geography, and Islamic Education. Examples related to environmental issues… improper waste disposal can lead to environmental pollution. The topic can be applied by to identifying areas that are most and least polluted, or identifying waste materials that contribute the most to pollution. The effects of this pollution can then be discussed in the subjects listed above.* (Post-Module 3 Survey, Open-ended Question 2)

**The excerpts have been translated from Bahasa Malaysia. The original excerpts are in Appendix A.*

The results suggest that, overall, Module 3 has made the educators see the potential of the Multi-, Inter- and Transdisciplinary pedagogical approaches in ESD, although their struggle to complete the syllabus places constraints on applying these approaches effectively.

4.4 Objective 4: To Foster School-Community Collaboration to Apply Learning Meaningfully

Module 4 focused on collaboration and partnerships at the local, national, and international levels in delivering ESD. Only twenty-two (22) participants responded to the Pre-Module 4 survey. These educators were from five of the seven schools involved in the study. The overall results are given in Figure 12.



The Post-Module 4 **mean score was higher by average**. The difference between the means **(MD) was 0.086**. The **SMD was 0.1**, which indicated an overall very small size intervention effect of Module 4.

FIGURE 12: Overall means of educators' self-evaluated perceptions of collaborative partnerships

A deeper analysis was done by grouping selected survey items into two constructs: (a) Effect from in and around the School Community Collaboration, and (b) Effect from National and International Collaboration. The means, MD, and SMD results for these constructs in the Pre- and Post-Module 4 surveys are shown in Figure 13.

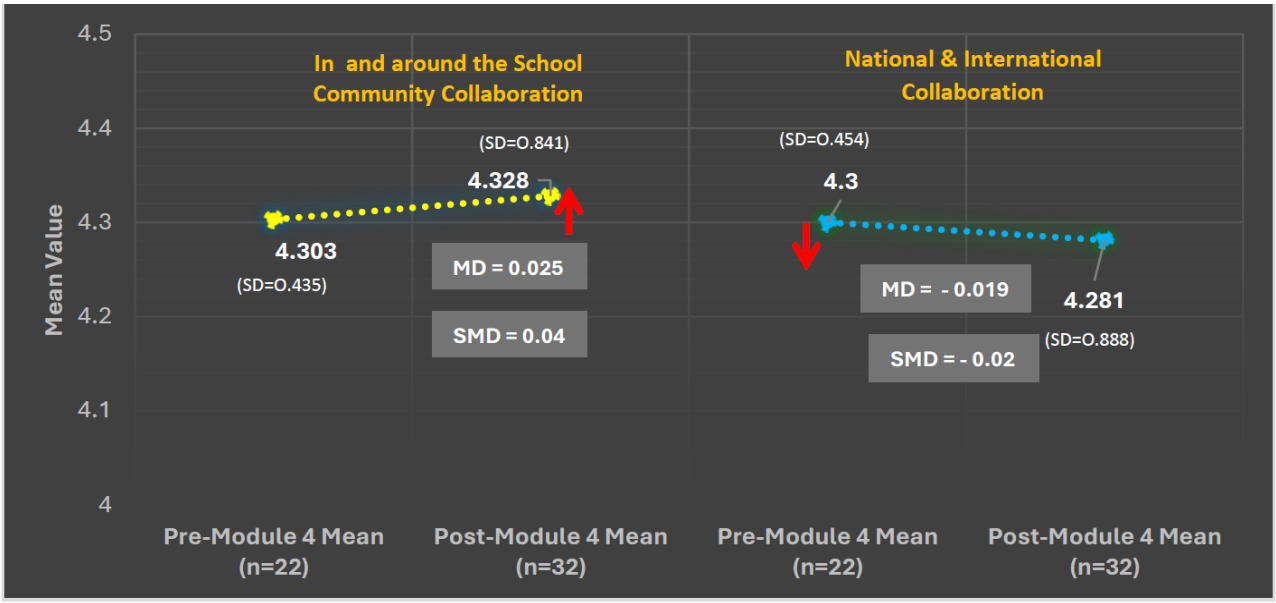


FIGURE 13: Educators' self-evaluated perceptions of school, national and international collaborative constructs in pre- and post-Module 4 surveys

The Post-Module 4 mean scores were a little higher by average **(MD=0.025)** for collaboration in the school context construct, but lower by average **(MD= -0.019)** for the national and international collaboration construct. The **SMD** of the "In and around School Community Collaboration" construct was **0.04**, indicating a very small intervention effect. The **SMD** of the "National and International Collaboration" was **-0.02 (negative)**, which indicated that the educators did not understand this construct.

Further analysis was done by grouping selected items into two more constructs: (a) Effect of Collaboration on Teachers, and (b) Effect of Collaboration on Students. The mean and standard deviation results for these constructs in the Pre- and Post-Module 4 surveys are shown in Figure 14.

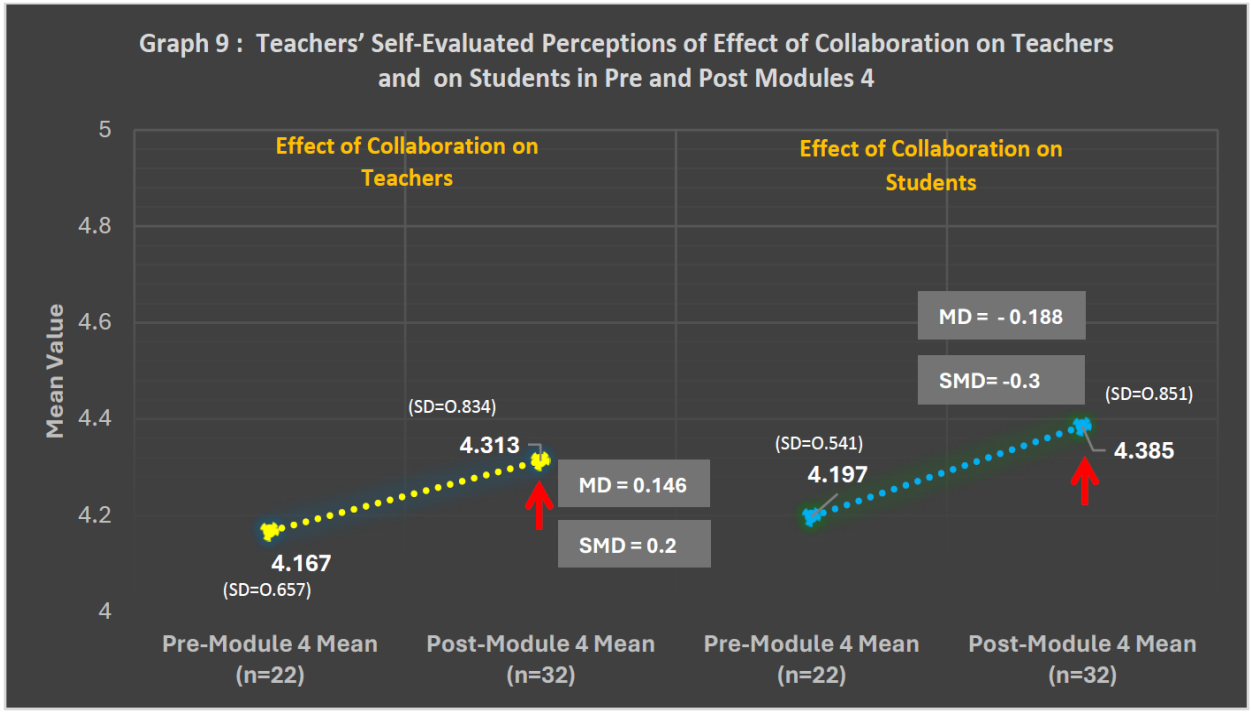


FIGURE 14: Educators' self-evaluated perceptions of the effect of collaboration on educators and students in pre- and post-Module 4 surveys

The Post-Module 4 mean scores were a little higher on average for both constructs **(Effect of Collaboration on Teachers, 0.146; Effect of Collaboration on Students, 0.188)**.
The SMD results **(Effect of Collaboration on Teachers, 0.2; Effect of Collaboration on Students, 0.3)** indicated a small size intervention effect of Module 4.

4.4.1 Objective 4 Qualitative Insight

Qualitative data indicates that the participating educators may not fully understand the concepts of partnerships for ESD shared in Module 4. Several of the participants cited yearly programmes organised by NGOs and the local authorities in relation to sustainability as ESD partnerships, though these were only "one-off" activities. For example, the following activities were cited by participants before completing Module 4*:

"JPWPKl science innovation project and gispro project . . ."

"Madani Community Clean-Up"

"Young Scientist, Sains Fair"

"Go Green Program - International level, Guinness record"

"ASTI - national level Science Fair, Storytelling Performances - University of Malaya"

"B40 Student Welfare Programme"

(Pre-Module 4 Survey, Open-ended Questions 1-4)

The above activities were not partnerships, but one-off activities or competitions that schools are invited to participate in.

Nevertheless, after exposure to Module 4, several educators suggested ideas related to working with NGOs and emphasising Earth Day, World Environmental Day, and such, as below*:

"Yes, many schools collaborate with NGOs such as WWF or MNS to run sustainability programmes. Example: Schools could partner with WWF Malaysia to organise an 'Environment Day' programme that includes educational activities on biodiversity conservation. This programme might involve talks, workshops, and field activities, where students learn about the importance of protecting the environment. NGOs can also prepare educational materials and other resources to support these activities. Such collaboration broadens students' knowledge and raises their awareness of sustainability issues." (Post-Module 4 Survey, Open-ended Question 3)

"Yes, many schools take part in global sustainability initiatives such as 'Earth Hour' or the 'Global Climate Strike.' Example: A school might participate in 'Earth Hour' by hosting activities such as switching off the lights for an hour and holding discussions about the importance of energy conservation. Students can also get involved in awareness campaigns through posters and presentations…" (Post-Module 4 Survey, Open-ended Question 4)

**The excerpts have been translated from Bahasa Malaysia. The original excerpts are in Appendix A.*

The results for Module 4 suggest that there is still a long way to go to attain deeper understanding of mutually beneficial collaboration. With greater exposure, educators would be able to deepen their appreciation of the potential of school-community collaboration to be engines of more meaningful learning (and not merely for activities).

4.5. Summary of Findings

In conclusion, it was found that the training modules had small to medium size intervention effects among participants.

Module 1	Module 2
Mean Difference: 0.393 Standard Mean Difference: 0.7 A medium size intervention effect overall	Mean Difference: 0.177 Standard Mean Difference: 0.3 A small size intervention effect overall
Module 3	**Module 4**
Mean Difference: 0.364 Standard Mean Difference: 0.6 A medium size intervention effect overall	Mean Difference: 0.086 Standard Mean Difference: 0.1 A very small size intervention effect overall

TABLE 13: Summary of module intervention effects

It is important to note that the concepts shared with the educators across the four modules were very new to them. Concepts such as sustainability mindsets; ESD competencies; multidisciplinary, interdisciplinary transdisciplinary pedagogies; and collaborative partnerships were something the educators have not encountered or tried before. The level of unfamiliarity with the concepts indicates that educators would benefit from more training hours to allow better internalisation and grasp of the learning.

However, in the case of most schools, the programme consisted of **six two-hour sessions of interaction, as opposed to five three-hour sessions as was initially planned**, mainly due to late arrival of participants, delayed start times, and many disruptions due to school activities.

With longer sessions of at least four hours of focused, undisrupted interaction per session, the size of the intervention effects can be improved; and, with regular application of the learning, educators can master ESD for the benefit of their students as well as their own professional development.

5

EMERGENT INSIGHTS

This chapter further examines the outcomes of the piloted implementation of theESD Educator Training Programme. Much of the ESD-related content introduced was unfamiliar and new to the educators. Nonetheless, as outlined in Chapter 4, the pilot programme demonstrated that participants gained knowledge and awareness of ESD concepts, including sustainability mindsets, core competencies, transformational pedagogies, and collaborative delivery and project implementation—all of which were very new to them.

An analysis of the qualitative data highlights other insights that emerged, including the potential for more impactful and far-reaching intervention effects given the right supporting environment (which will be elaborated in the next Chapter on Next Steps). It also uncovers hidden, underlying potential among the participants that could be further developed and harnessed.

These insights will be discussed under three main themes of: (1) The Untapped Potential; (2) Understanding of "Professional Development"; and (3) Understanding Teaching as a Profession and Teacher Professionalism.

5.1 The Untapped Potential

5.1.1 Realising the importance of ESD

It was evident that exposure to ESD can harness an evident untapped potential amongst Malaysian educators. Many participants demonstrated that they had absorbed and internalised the concepts shared during the sessions, that they were never exposed to before. They recognised the significance of ESD and its potential to bring about meaningful change in their practices. The excerpts below* highlight this potential observed among participants.

"ESD is the next step to prevent a bad future." (Personal Log after Module 2, Reflection 1b)

"In my opinion, we need to practise this in schools so that students can preserve the environment's vitality for the future." (Personal Log after Module 2, Reflection 2)

"A good module for knowledge." (Overall Feedback after Module 2)

Participants related knowledge of ESD to a sustainable future. They

"I…need to start with myself, then only can I change my students' mindset." (Overall Feedback after Module 2) *"After attending the Teacher Training in ESD programme, I realise the vitalness of raising environmental awareness within students' own selves as very important and must be instilled in schools."* (End of Programme Commitment Survey) *"Because ESD is very engaging and can help make the PDPC process more effective."* (End of Programme Commitment Survey) *"My answer changed when I began to realise education's importance in shifting society's perspective. Teachers can be agents of change, like Rachel Carson."* (Post-Module 1, Question 4)	realised that the ESD approach will make the teaching-learning process more effective. They also realized that they must change first, before they influence their students' mindsets.

**The excerpts have been translated from Bahasa Malaysia. The original excerpts are in Appendix A.*

5.1.2 Practicing the 4 core ESD competencies

The introduction of the four ESD competencies—Learning to Know, Learning to Live Together, Learning to Be, and Learning to Do—captivated many participants. The excerpts below reveal that they recognised these competencies as valuable frameworks to incorporate into their teaching and learning practices.

"Interesting. Provides ideas to be implemented in class." (Overall Feedback after Module 2) *"Good module for knowledge."* (Overall Feedback after Module 2) *"This session really had a positive impact on me in terms of sustainability education*." (Overall Feedback after Module 2) *"Yes, after completing this training, I will utilise the knowledge gained about ESD to change my teaching approach. I aim to incorporate sustainability concepts into my lessons, engage students in critical discussions about environmental issues, and implement project-based learning that promotes practical applications of sustainability. This shift will help foster a more holistic understanding of sustainable development among students, encouraging them to take action in their communities."* (End of Programme Commitment Survey)	Participants felt they could practice the ESD competencies in their classrooms The sessions had a positive effect on them.

**The excerpts have been translated from Bahasa Malaysia. The original excerpts are in Appendix A.*

5.1.3 Transformative pedagogies

Educators have predominantly adhered to mono-disciplinary teaching, where one teacher is responsible for a single subject. However, the sessions introduced multidisciplinary, interdisciplinary, and transdisciplinary approaches, which the educators linked to transformative changes in teaching and learning practices.

"I believe that planning interdisciplinary school activities is a very effective and important approach in modern education. This approach gives students the opportunity to see how different fields of knowledge intertwine and build a deeper and more holistic understanding of the world around them." (Post-Module 2, Question 5)

"The integration of various fields in learning activities…encourages sustainable development practices." (Post-Module 2, Question 6)

"Suitable for the transformation needed." (End of Programme Commitment Survey)

"This collaboration enables students to understand the theme of sustainable development from various perspectives, stimulating critical thinking and positive actions towards the environment." (Post-Module 3, Question 2)

Participants appear positive about multi, inter-, and transdisciplinary approaches to teaching, which were new to them.

**The excerpts have been translated from Bahasa Malaysia. The original excerpts are in Appendix A.*

5.1.4 Caring for future generations

Many educators were able to envision how ESD could influence future generations, paving the way for a sustainable future while equipping them with essential problem-solving skills. The excerpts illustrate this.

"For the future generation." (End of Programme Commitment Survey)

"This approach emphasises the need to make balanced and responsible decisions, taking into account the sustainability of natural resources, social justice, and economic stability, to ensure the well-being of current and future generations." (Personal Log after Module 1, Reflection 4)

"The integration of sustainability thinking into higher education can be continued to ensure future generations are capable of solving complex problems sustainably." (Personal Log after Module 1, Reflection 5)

Participants recognized their important role in preparing the generations to come for a sustainable future through ESD.

**The excerpts have been translated from Bahasa Malaysia. The original excerpts are in Appendix A.*

It was encouraging to note that participant educators recognised the effectiveness of ESD in improving their teaching practices. Some educators shared that, after completing the modules, they endeavoured to try new approaches and expose their students to new ideas. For instance, they showcased videos on climate change and introduced students to sustainable life choices. Some moved away from the use of paper and used digital options like Google Forms instead.

To build on these efforts, school heads must ensure that teachers are allocated sufficient time to plan and integrate innovative approaches into the teaching and learning processes in their schools.

5.2 Understanding of "Professional Development"

Professional development for educators aims at enhancing knowledge and skills with the changing times, and to assist educators in deep reflection and learning that can lead to actions that will improve their practice, impacting student learning. In this respect, the pilot project faced several challenges. The discussion below indicates how participants "see" professional development.

5.2.1 Attendance and punctuality

Although pilot schools joined the study agreeing to a "whole-school approach"—meaning that all the educators (including school leaders) would participate together in five three-hour sessions on dates provided by the schools themselves—this did not occur. Example observation excerpts illustrate this. (Note: O - Observation)

"Many teachers left mid-way because they had extra class." (O, School 1, 22 April 2025)

"Only 54 teachers came out of 155! Low turnout. We were told there was a field trip to the wetlands that day, which exhausted the teachers, especially with the heat." (O, School 2, Session 2, 21 May 2024)

"Attendance significantly lower. Many clashing activities scheduled on the same day." (O, School 1, Session 2, 6 May 2024)

"Very poor turnout. Less than half." (O, School 3, Session 1, 8 May 2024)

"The School Head told the [research] team to finish half an hour earlier." (O, School 1, Session 2, 6 May 2024)

"The session began half an hour late, as some teachers came in late. Some were an hour late." (O, School 1, Session 3, 20 May 2024)

Attendance and punctuality seemed to lack the necessary emphasis.

5.2.2 Attitudes and behaviours

Educators' attitudes and behaviours towards attending professional development sessions are important for acquiring the knowledge being delivered. The following excerpts highlight the areas where attitudes and behaviours might not align with expectations.

Preparation before each session:

"It did not look as if they had read anything in advance in preparation for today. When asked about the eight sustainability mindsets, all looked blurry." (O, School 1, Session 2, 6 May 2024)

"Teachers were not prepared for Module 2. They did not pre-read the materials given to them." (O, School 2, Session 3, 21 May 2024)

"The teachers were heard discussing during the activity without any reference to the information given to them. Only when asked did they start looking for the information on sustainability mindsets, ESD characteristics, and competencies." (O, School 2, Session 22, 1 May 2024)

Handbooks for each module were shared ahead of the sessions to provide guidance. However, it seems that some teachers did not fully review these handbooks.

"Attitude" towards professional development programmes:

"One teacher expressed that teachers are very busy. At times they have no time to eat, so much work to do. They are asked to do this and that, so they really find it a burden to answer Google Surveys and fill up Personal Logs for our sessions." (O, School 1, Session 3, 6 May 2024)

"Another teacher asked that we just provide the activities according to the different subjects we want them to do in class and they will do it." (O, School 1, Session 3, 6 May 2024)

"Many activities require HOTS (Higher Order Thinking Skills). Various activities after work-hours are tiring for us. We just want to know what we should do to change future generations and obtain suggestions on how to apply knowledge to our students." (Overall Feedback after Module 2)

"A sense of wanting to rush through the programme and leave appears to be the culture." (O, School 1, Session 3, 20 May 2024)

"A teacher remarked that the log was too vague and requested more 'plug and play' activities and lesson plans that they can use. This can be seen as reluctance to think…" (O, School 1, Session 3, 20 May 2024)

"Teachers are generally motivated by rewards. We observed teachers were more interested in ensuring they secure certificates of participation at the end of the programme, rather than indulge in the process of knowledge acquisition for self-development and lifelong learning. Teachers attended the

At the start of the programme, participants were introduced to the concept of **self-directed learning** as a foundation for all sessions. The aim was to support them in gaining knowledge and skills to navigate the evolving educational landscape. However, the excerpts suggest that this concept may not have been fully understood.

sessions because they were being closely monitored by the school leadership and because they could earn training points for their KPIs." (Trainers' reflection across sessions)

**The excerpts have been translated from Bahasa Malaysia. The original excerpts are in Appendix A.*

Disinterest in professional development programmes:

"Two…teachers seemed uninterested in the session. One was watching Facebook shorts at the start of the session. During the presentations, they were chatting away." (O, School 4, Session 2, 27 July 2024)

"Teachers appeared preoccupied with tasks, such as marking exam papers and completing administrative work." (O, School 1, Session 3, 20 May 2024)

"During the presentations, many teachers sat outside the office and chatted and did not observe their colleagues. Some even 'punched-out' and went off." (O, School 2, Session 1, 7 May 2024)

Each session builds upon the one before, creating a progressive learning experience. The lack of full engagement hinders participants from gaining the most out of the programme.

Unwilling to get out of the comfort zone:

"On 22 January 2024, our Prime Minister at a Universiti Malaya event stated that the country cannot be in denial about the state of its education system. This was shown to the teachers. When asked how can learning environments be further enriched for our students, one teacher asked, 'Isn't what we have enough?' The answer given was, 'It can be better,' which did not go well with many of the teachers." (O, School 1, Session 3, 20 May 2024)

"One teacher then asked, 'What is meant by "enrich further?"'" (O, School 1, Session 3, 20 May 2024)

There seems to be a reluctance among educators to embrace new and effective ideas.

5.2.3 Leadership

School leadership plays a pivotal role in shaping the trajectory of educators and students alike. By emphasising instructional leadership, school leaders not only motivate life-long learning but also foster an environment where professional development becomes a priority. This approach ensures educators stay equipped to navigate the ever-changing global educational landscape.

"Not all school heads were visible in the teachers' sessions. Although the assistant heads were present, some teachers did not attend every session. Others just walked in late, or walked out for extra classes. Some were absent because they had to follow students for events or sports meets." (Trainers' reflections across sessions)

"In School 1, the head popped in now and then. However, how much of the sessions were actually understood is a question mark. Also, this head asked the trainers to stop the session half an hour earlier than planned because the teachers have expressed that they wish to end earlier." (Trainers' reflection across sessions)

"It appeared as if the training was a KPI tick-box exercise for some of the school heads. There was more importance placed on ensuring attendance of the teachers is captured rather than ensuring the training content is duly internalised and appreciated." (Trainers' reflection across sessions)

"It was refreshing to see all the heads of Schools 5, 6, and 7 come for almost all the sessions and participate in most of the activities. The teachers were more focused and if they had to leave early, they informed early, which the school leaders endorsed and explained." (Trainers' reflection across sessions)

"The bottom up approach to such a critical issue (ESD) will not work." (End of Programme Commitment Survey)

School leaders play a vital role in shaping the future of education. As instructional leaders, it is important for them to stay informed about evolving challenges and inspire awareness of the continuous need for growth in teaching and learning.

Professional development programmes are essential for empowering educators to stay ahead in an ever-evolving educational landscape. To maximise the benefits, school heads and educators must be ready to absorb new knowledge and apply it effectively. In the study, participants were encouraged to maintain a personal log at the end of each session, complete post-module surveys, and practice their newly acquired skills in the classroom before the next session. These activities were designed to foster reflection and application. However, data revealed that many participants did not engage fully in these processes. This lack of engagement likely diminished the overall impact of the intervention modules.

This section raises the critical question of whether educators truly understand the importance of professional development. Without a culture that places value on professional development and lifelong learning, efforts to elevate the quality of the national education system may fall short.

5.3 Understanding and Professionalism and Teaching as a Profession

There is an ongoing debate about teaching as a profession and teacher professionalism. Both terms are not static but are continually evolving (Masson, 2025) and have been revisited multiple times (Newman, 2025). The Cambridge Dictionary defines a "profession" as **"any type of work that requires special training or a particular skill, often one that is respected because it involves a high level of education."** The teaching profession can be described as **"a professional occupational group within the education sector, possessing social, cultural, economic, scientific, and technological dimensions"** (Hotaman, 2010, p. 1416). "Professionalism," as defined by the Cambridge Dictionary, refers to "the combination of all the qualities connected with trained and skilled people."

The Malaysia Education Blueprint Executive Summary (2013–2025) states, "**Teaching will be a prestigious, elite profession that only recruits from the top 30% of graduates in the country. Teachers will receive the best training possible, from the time they enter their teacher training programmes, through to the point of retirement"** (MOE, 2013, p. 29). This suggests that Malaysian teachers are provided with a strong foundation. However, despite this desirable aspiration, the pilot study revealed certain weaknesses in the professionalism of educators. The rhetoric of the educators is further described in the study, along the themes below.

"Not in the curriculum":

"We cannot teach outside of the curriculum. When it's part of the curriculum, then yes." (End of Programme Commitment Survey) *"At the end of the day, the school wants A's. We must follow the curriculum."* (Trainers' reflection across sessions)	ESD elements are integrated into the curriculum, providing a valuable foundation. While explicit instructions serve as useful guidelines, educators are encouraged to embrace creativity in their approach to enhance teaching and learning experiences.

Time constraint, lack of expertise:

"Time constraint and effective implementation methods are challenges for transformative pedagogies." (Personal Log after Module 3) *"Every teacher usually has expertise in a particular subject, and combining two or more subjects requires careful coordination between teachers. Sometimes students may not have in-depth knowledge in other fields—causing difficulty in planning effective learning activities."* (Personal Log after Module 3)	Time management skills and knowledge can continue to be developed, even for senior teachers. As dedicated professionals,

"Learning to Do is very difficult to implement 100% with the generation of seniors teachers today." (Personal Log, Module 2, Reflection 3b) *"The activity (during one of the sessions) required them to imagine a class in the year 2035. But they stuck to present methods of teaching—no future pedagogical plan was put forward. Could be they are very used to directly transferring important facts and concepts to their students. Did not see any 'thinking outside the box.'"* (O, School 4, Session 2, 10 August 2024) *"Because we are not able to educate the students with this approach."* (End of Programme Commitment Survey) *"School's tight routines often cause teachers to have insufficient time to plan and implement collaboration."* (Personal Log after Module 4, Reflection 2)	educators are encouraged to embrace growth and explore new approaches to enhance their teaching methods. To support this, school leaders are advised to exercise flexibility, providing teachers with the space to creatively manage teaching and learning processes.

**The excerpts have been translated from Bahasa Malaysia. The original excerpts are in Appendix A.*

Finishing-the-syllabus syndrome:

"I am too busy with the SPM syllabus and hold several portfolios that are demanding." (End of Programme Commitment Survey) *"The work burden is too much. I do not wish to add other commitments. I just want to focus on completing the packed and varied syllabus."* (End of Programme Commitment Survey) *"Teachers intend to teach the syllabus."* (Personal Log after Module 3) *"One teacher said that ESD class lessons and project work is a lot of extra work."* (O, School 1, Session 3, 20 May 2024) *"When asked if they tried out any ideas in their classroom after sessions 1 and 2, the answer was 'No', as they had no time and had to finish the syllabus."* (O, School 3, Session 3, 12 June 2024)	Some educators might struggle to see that ESD isn't an additional task that burdens their workload, but instead a natural and integral part of daily teaching and learning practices.

**The excerpts have been translated from Bahasa Malaysia. The original excerpts are in Appendix A.*

No interest and not motivated to be involved in ESD*:*

"Not interested." (End of Programme Commitment Survey) *"Family commitments."* (End of Programme Commitment Survey) *"Not interested due to the heavy workload and commitment in school."* (End of Programme Commitment Survey) *"We are aware this is for the future but we lack motivation."* (Personal Log after Module 1, Reflection 5)	A few educators expressed that they were not interested or motivated, likely due to their existing commitments and priorities.

**The excerpts have been translated from Bahasa Malaysia. The original excerpts are in Appendix A.*

Educators often emphasise the significant responsibility of completing the syllabus. However, research suggests that alternative teaching approaches can streamline this process while also equipping students with valuable skills. Instead of focusing solely on delivering every fact and concept in the curriculum, educators could consider empowering students to independently explore and discover concepts.

For Malaysian educators who view themselves as well-trained professionals, it is important to continue enhancing their skills and maintaining an openness to acquiring new knowledge and techniques.

5.4 Summary of Findings

The pilot study highlights promising potential among educators who recognise ESD as a future-oriented framework. This perspective can serve as a foundation for driving meaningful transformation in teaching and learning. However, challenges remain in implementing ESD effectively, as some educators express concerns about workload, syllabus completion, and strict curriculum adherence. Furthermore, limited awareness of the importance of lifelong learning, continuous upskilling, and professional development presents additional barriers.

Addressing these aspects is crucial to elevating teaching as a respected profession and fostering greater teacher professionalism.

6

FUTURE STEPS – A MODEL FOR THE FUTURE OF EDUCATION IN MALAYSIA

Education for Sustainable Development (ESD) aims to equip students with the knowledge, skills, attitudes, and values necessary to shape a sustainable future. Studies have demonstrated that ESD significantly enhances learning outcomes (Concina, 2019), where students exhibit improved critical thinking and problem-solving abilities, greater social responsibility, and enhanced cooperation skills. These competencies are crucial for addressing complex sustainability issues and contribute to the overall development of well-rounded individuals, in alignment with Malaysia's National Education Philosophy.

Furthermore, integrating ESD into education systems has been linked to higher academic performance and better engagement in learning. Research indicates that when students understand the relevance of their education to real-world issues, they are more motivated and invested in their studies (Piao, 2024). This relevance not only makes learning more meaningful but also helps students retain information and apply their knowledge in practical contexts. By promoting active learning and interdisciplinary approaches, ESD fosters a deeper understanding of subjects and encourages lifelong learning habits. As a result, students are better prepared to navigate and contribute to a rapidly changing world (UNESCO-UIS, 2015), making ESD a vital component of Malaysia's future education system.

Chapter 1 showed how educators are pivotal in shaping students' perspectives and understanding of the world, positioning them as central to the successful integration of ESD in the education system. Chapter 4, however, revealed that the impact of intervention in educator capacity-building and pedagogical change must be supported by corresponding systemic organisational and policy environments—including leadership structures—that sustain the transformation.

Figure 15 below shows the result chain that was introduced in Chapter 1:

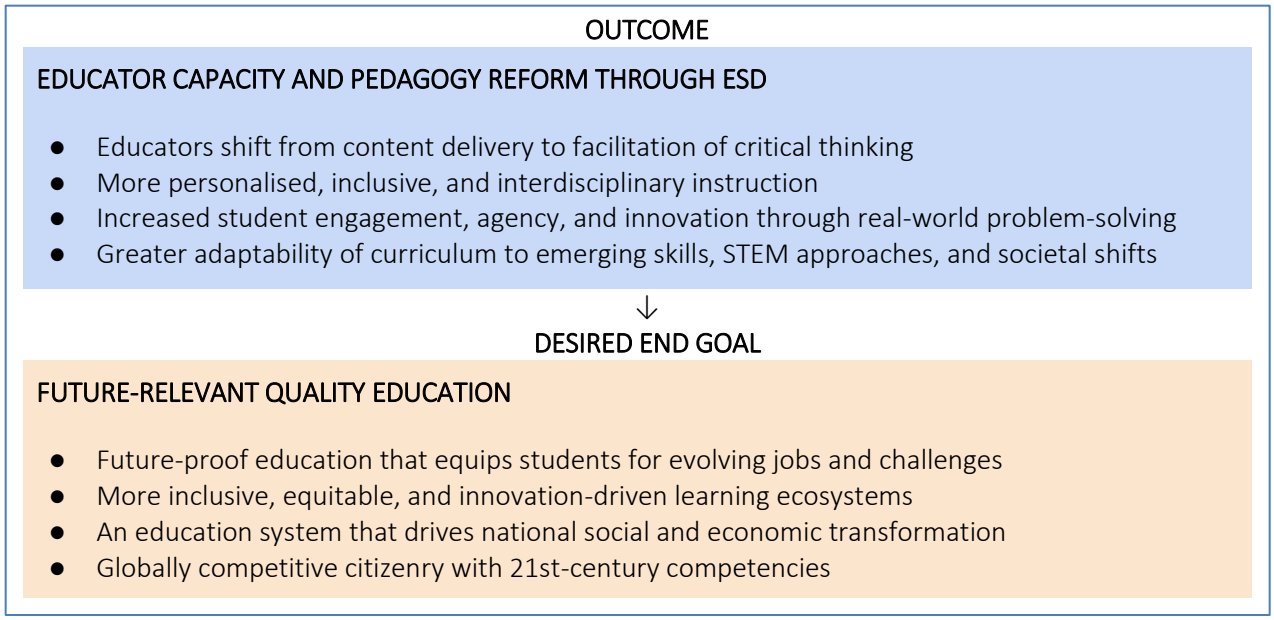


FIGURE 15: Proposed intended outcome that will support the desired end goal

Chapter 4 presented the results and of the pilot programme's intervention effects and outcomes, making a strong case for scale-up that will then lead to educator capacity and pedagogy reform that supports the desired end goal of future-relevant quality education. The following section provides a model for scaling this programme nationwide.

6.1. Scope of the Scale-up

6.1.1. In-service educators

A key feature of scaling the programme is having sufficient trainers to deliver the programme. There are approximately 10,237 public schools in the country, where 414,404 teachers are currently in service.[9] The piloted model, where training was delivered school by school, may seem daunting; however, if viewed on a district-to-district basis, the task appears less formidable. There are 160 administrative districts, including the four states (Perlis and the 3 Federal Territories) which do not have subdivisions, and approximately 140 District Education Offices (*Pejabat Pendidikan Daerah*, PPD), roughly translating to an average of 70 schools per PPD.

The scaling up plan is depicted in Figure 16 below.

[9] Ministry of Education statistics as of 31 January 2025

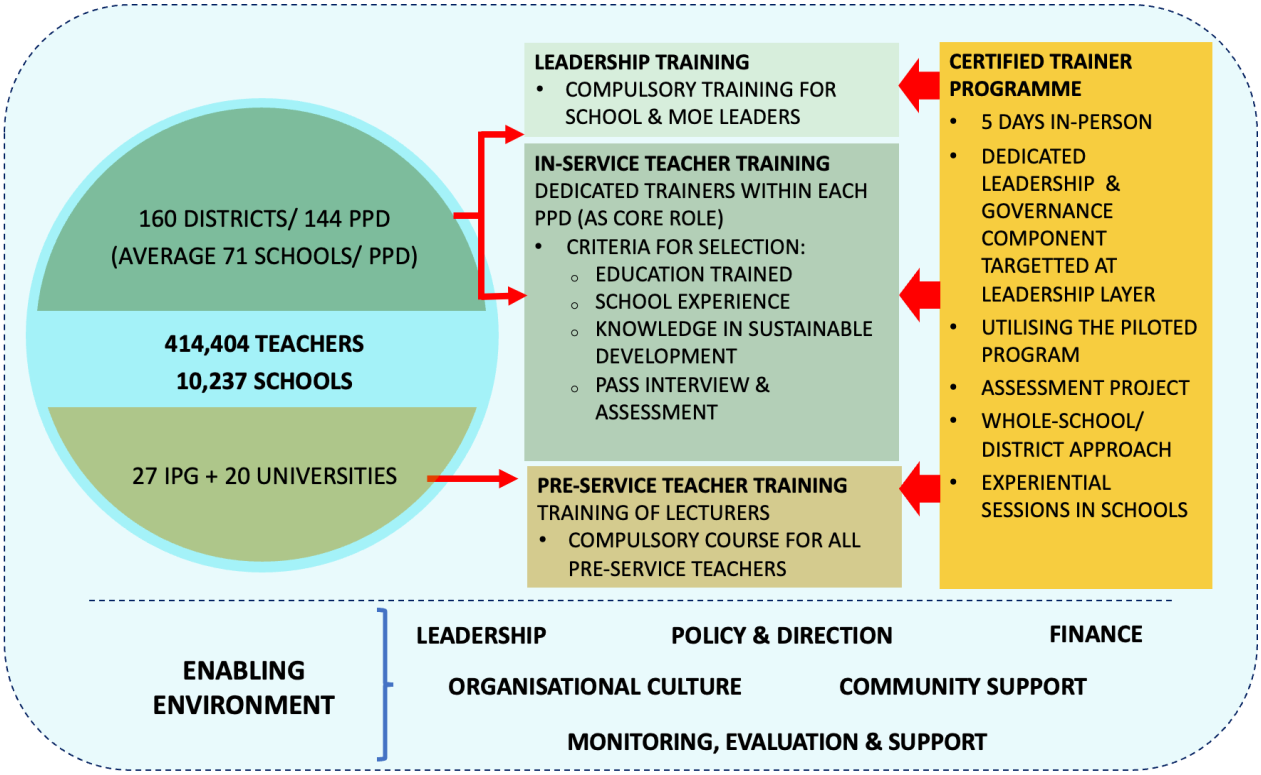


FIGURE 16: ESD Educator Training Programme Proposed Scale-Up Plan

It is our recommendation that experts within the PPDs be trained as Certified Master Trainers (CMT) and be deployed thereafter to deliver ESD training to teachers in all schools in their districts. This newly assigned responsibility should be made the core role of these experts, and it is recommended that there be a minimum of two such roles within each PPD (and more for districts with larger populations and number of schools).

Ideally, the trainers should fulfil the following criteria:

1. formal education qualifications at the tertiary level,
2. prior experience serving in a school as educators,
3. knowledge and understanding of sustainable development, and
4. pass a suitability interview and assessment prior to acceptance into the programme.

Section 5.2.3 of Chapter 5 explored how school leaders play a vital role in shaping the future of education. Part of the CMT programme will therefore be dedicated to training school leaders, as well as leaders in the national/ state/ district public sector education machinery.

6.1.2. Pre-service educators

Pre-service teachers are another crucial target group that should receive the training. The opportunity to expose them to the contemporary concepts and pedagogical strategies that ESD offers should not be

missed. It is our recommendation that the ESD training be made compulsory for all pre-service teachers as part of their teaching qualification, such as the *Program Ijazah Sarjana Muda Perguruan* (PISMP), and that lecturers and academics in the 27 Teacher Education Institutes (Institut Pendidikan Guru, IPG) and schools of education in the 20 public universities be deployed for this purpose. Training the lecturers in the IPG and faculty members in universities may be more straightforward than training experts in the PPDs, as these lecturers and academics are already in the business of training teachers. However, the suitability interview and assessment should apply to this group as well.

6.2 Enablers

The efficacy of an ESD teacher training programme relies on certain factors, or enablers, in order for it to succeed. The enabling environment introduced in Figure 16 above is also shown in Figure 17 to depict how that environment supports the desired end goal of Future-Relevant Quality Education.

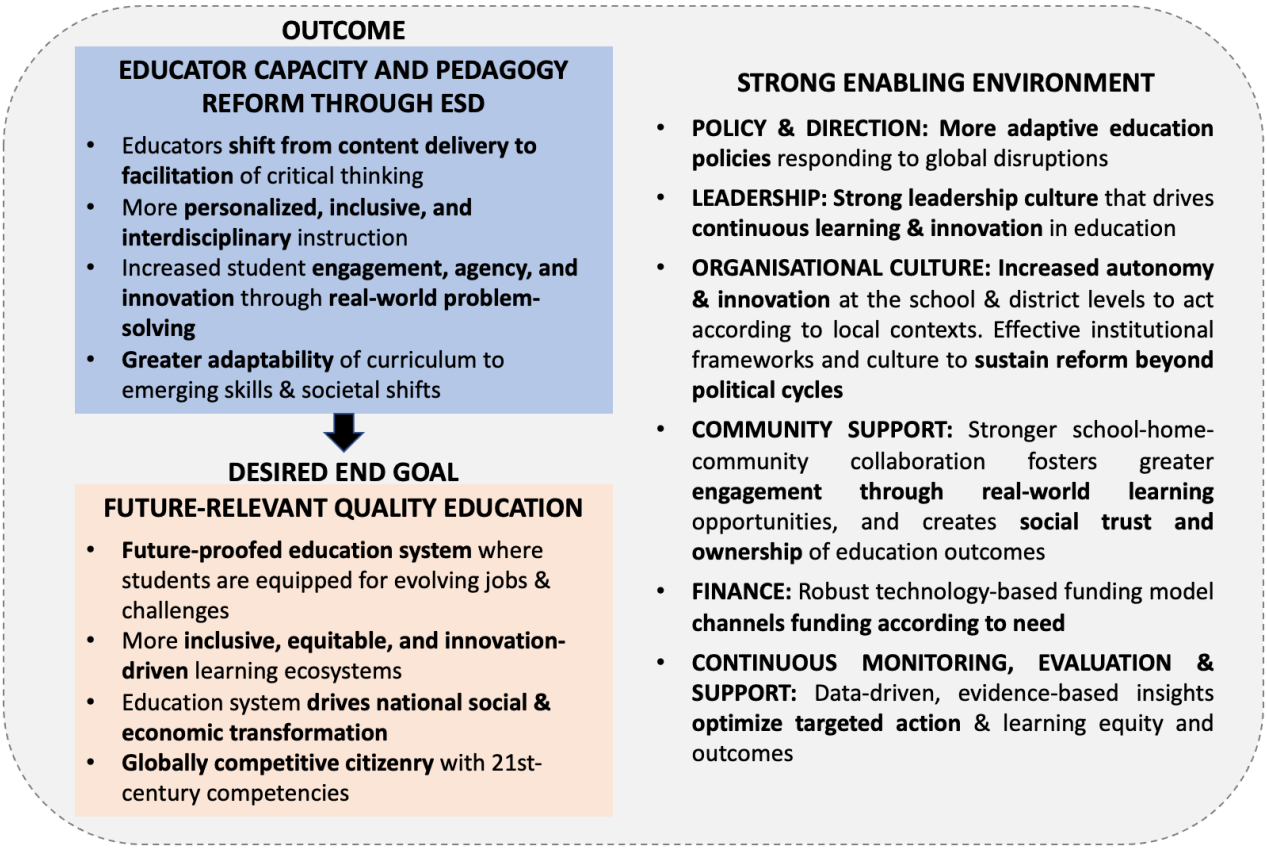


FIGURE 17: Enabling Environment to Support the Outcome and Desired End Goal

Based on the pilot teacher training programme, we have recognised six clear enablers for future training sessions: (1) Policy & Direction; (2) Leadership and Training for School Leaders; (3) Organisational Culture; (4) Community Support; (5) Finance; and (6) Continuous, Monitoring, Evaluation and Support.

6.2.1 Policy and direction

Institutionalising ESD through clear policy direction is essential to ensure that it becomes a sustained and systemic priority, and not a series of fragmented initiatives. This requires deliberate integration of ESD into written policy, curriculum standards, teacher development pathways, quality assurance systems, and governance frameworks.

Policy and direction are key enablers of ESD because they create the formal structures, mandates, and incentives that drive long-term systemic change. Without supportive policies, ESD efforts often remain localised, underfunded, inconsistent, or inaccessible. Strong policy frameworks provide legitimacy, alignment, and accountability, allowing schools, educators, and partners to embed sustainable development into teaching, learning, and institutional practices. Furthermore, policy can act as a catalyst for cross-sector collaboration, ensuring that education systems are responsive to national sustainability goals and international commitments such as the SDGs and climate action plans.

Supporting recommendation

- **Institutionalise ESD by explicitly prioritising it in Malaysia's next Education Blueprint** to ensure continuity across political cycles. Defining ESD as a right and responsibility within national policy signals long-term commitment and creates the mandate for reform.

- **Deploy suitable ministry, state, and district education officers to be solely responsible for ESD implementation**. Without dedicated units and officers, especially at the district/local levels, policy cannot translate to meaningful implementation. Each PPD will greatly benefit from having trained experts responsible for delivering and monitoring ESD training in their district.

- **Clearly emphasise the importance of educators' professional development in ESD in policy documents, guidelines and directives** to ensure educators are equipped to deliver sustainability competencies, such as critical thinking, systems understanding, and future-oriented decision-making, alongside subject-specific content.

- **Mandate the integration of ESD holistically across subjects, grade levels, and learning outcomes using the existing curricula and the revised curricula planned for 2027 and beyond**. Supplementary resources and guidelines developed by the National ESD and GCED Strategic Alliance,[10] in partnership with the Ministry of Education, will support educators and curriculum developers in integrating ESD throughout the curriculum.

[10] A formal alliance established by the Ministry of Education in July 2024, comprising experts and actors that have been working in the ESD and GCED space in the country, to assist in advancing ESD and GCED in the country, from planning to implementation and outcome-impact evaluation.

6.2.2 Leadership

Leadership encompasses school leaders as well as leaders in the federal, state, and district education governance structure. They are the key enablers of education transformation, especially when addressing complex and interconnected challenges like sustainability. Leaders can set the tone, cultivate a culture of learning, and influence how priorities are interpreted and enacted through the system in the best interest of the learners and schools under their jurisdiction. They are the key custodians of a whole-system approach that can model sustainable values, improved learning outcomes, and a culture that aligns with ESD goals.

Leaders are essential for translating policy mandates into meaningful action at the school and/or local levels, navigating change with autonomy, empathy, and strategy. Without empowered and committed leadership, efforts to embed ESD risk remaining superficial or fragmented. Leaders who are well-informed of both the importance and structure of ESD can better prioritise and support its integration, including capacity-building, availing resources, and collaborative planning. It was observed during the ESD pilot programme that the active participation of leaders in training had a positive influence on teachers' engagement, excitement, and commitment to applying the learning, as compared to schools where leaders were not present during the training.

Supporting recommendation

- **Champion widespread training for those at the leadership layer** to enable a whole-school/ whole-district approach to ESD. This involves structured training, mentoring, and coaching focused on ESD values, systems thinking, innovation, collaboration, change management, and inclusive decision-making.

- **Prioritise the training of the school leaders prior to training of teachers in a particular school,** especially in instructional leadership, a model of leadership that focuses directly on instructional practices capable of bringing about an institution's effectiveness (Hallinger and Murphy, 1985). The leader training will be an add-on to the ESD Educator Training Programme, developed to allow leaders to support teachers through the pedagogical transformative journey, including supporting teachers psychologically and motivating them to always keep the desired end goal in mind.

- **Empower leaders with the trust and autonomy to make decisions that they deem in the best interest of their schools and communities**, while removing bureaucratic restrictions and barriers to new and innovative strategies. The context of every school is unique, determined by geography, community demography, and student backgrounds. Therefore, the message must be made clear and explicit that leaders do not merely have the autonomy but are expected to exercise that autonomy to make decisions that are in the best interest of their students and communities, and to truly shape the organisational culture to be conducive to transformative education. (See the section on "Organisational Culture" below.)

6.2.3 Organisational Culture

SDSN's initial study on The Status of Education for Sustainable Development in Malaysia (Chand *et al.*, 2023), found that the right culture will reinforce ESD as a lived value, not just a formal mandate, making schools the future-facing learning organisations that the country needs. As an enabler, organisational culture is closely intertwined with leadership. While policy and direction set the foundation for ESD integration, organisational culture determines how deeply and authentically these reforms are embraced, carried out, and sustained. Culture encompasses the shared values, beliefs, behaviours, and informal norms and standards that the individuals in the organisation represent, and that shape their day-to-day decisions, practices, and priorities.

In Malaysia, a supportive organisational culture will bring the openness to change, in particular the openness of educators to self-reflect, view themselves as professionals, and pursue professional development according to the needs of the times. This pilot programme revealed that this culture is currently lacking in Malaysia.

Supporting recommendation

- **Launch a nationwide rebranding campaign to reposition Malaysia's education system as learner-centric, values-driven, and future-focused.** This can include a new narrative for public communication, national education branding, and visual identity guidelines to unify and signal change across all levels. Emphasis should be placed on how every segment of society is a stakeholder in education, including the private sector and civil society, and individuals should share ownership in its future trajectories.

- **Include culture change and systems transformation in a formalised, large-scale leadership training programme** to instil new ways of thinking amongst leaders in line with future-relevant quality education. This should apply to school leaders as well as education ministry and department officials, emphasising distributed leadership.

- **Prioritise a culture of professionalism and continuous professional development** as a powerful driver of change. Leaders must take a proactive role in ensuring that professional development is scheduled regularly and effectively, and is fully attended, enabling educators to engage meaningfully and implement ESD initiatives successfully. This will promote a culture of continuous learning, inquiry, and experimentation, and embed the learner-centric, values-driven, and future-focused education culture into professional learning communities, coaching systems, knowledge-sharing networks, reflective practice tools, and performance evaluation systems.

- **Encourage behaviours that support the development of future-relevant, quality education by de-emphasising syllabus completion and exam-centric teaching.** Promote a culture that values continuous professional learning, empowers educators, students, and school leaders to co-shape the ESD agenda, and encourages structured opportunities for shared leadership, feedback, and collaborative innovation. A culture that values contributions from all levels and prioritises the cultivation of ESD competencies will better prepare learners for complex future challenges rather than a culture of teaching to the test.

6.2.4 Community Support

Communities impact schools. Stakeholders such as parents, businesses, CSOs, and other community members are not supplementary parts of the education ecosystem – they share ownership and are active co-creators in education reform. Our pilot programme revealed that such co-creation remains an unfamiliar and untapped opportunity. By operationalising structured, inclusive, and meaningful partnerships, we can build resilient and future-relevant learning systems rooted in trust, belonging, and collective action.

These partnerships are also essential for anchoring education reform in real-world needs, values, and aspirations. Having lessons and activities related to the lived realities of the community makes learning more meaningful and engaging, thus ensuring relevance, resilience, better learning outcomes, and collective ownership of learning transformation. The pilot training programme revealed that more can be done to encourage working in partnership with external parties.

Supporting Recommendation

- **Develop a nationwide strategy to institutionalise the establishment of formal partnerships** with local community stakeholders, including NGOs, CSOs, CBOs, businesses, and social enterprises, making clear the priority for community engagement and real-world problem-solving, but leaving enough autonomy for schools to exercise the necessary agency to implement projects deemed relevant to the needs of their learners.

- **Train educators and school leaders in building reciprocal relationships**, with a focus on problem-solving and project-based learning. The ESD Educator Training Programme has a dedicated module on partnerships and community engagement that provides the know-how in pursuing mutually beneficial partnerships that will contribute to turning schools into living labs of solution-building.

- **Establish a centralised system where schools can showcase their local level actions and access support**. This would also help those in the community and beyond to channel support accordingly based on need and merit. It would also allow high-impact community projects to be identified and amplified to inspire similar efforts in different locations.

6.2.5 Finance

Financing is not just about securing funds – it is about strategically aligning financial flows, incentives, and budgeting systems with the desired end goal of education transformation. Sufficient and sustainable funding is essential to develop, implement, and maintain high-quality educator training programmes and the outcomes of such programmes. Without dedicated and coherent financing mechanisms, ESD risks being under-prioritised, inconsistently implemented, or overly reliant on ad-hoc, short-term donor support and pocket projects that are currently the norm.

Aligning MOE's financial policy with ESD sends a clear signal that ESD is a national priority worthy of long-term investment. It also enables better planning, coordination, and accountability while encouraging innovation and equity. Such a financial policy will also direct private funding to ESD initiatives in line with MOE's priorities, and empower districts and schools to invest in capacity building, pedagogical innovation, materials development, school-community partnerships and sustainability-focused infrastructure.

Supporting Recommendation

- **Establish earmarked funds within national and subnational education budgets for ESD initiatives.** This is mainly to cover large-scale and ongoing educator capacity-building, but can also include resources for curriculum integration, educator and school assessment, performance-based incentives, and school-level implementation. Performance-based incentives will motivate schools, teacher training institutions, and PPDs to drive ESD, and will further encourage innovation, experimentation, and scaling of successful models.

- **Establish a centralised system to channel private funds to schools according to need and merit.** This is related to the Community Support recommendation, where schools can register their financing needs, leveraging technology to reach potential private donors. Such a funding platform would enhance partnership engagement opportunities, create healthy competition amongst schools and districts, and direct external agencies to support nationally-endorsed programmes.

- **Align ESD financing with the desired end goal of future-relevant quality education** and necessitate for donors and development partners to harmonise funding to nationally endorsed programmes. This will enable impact at scale that cannot be achieved through ad-hoc and pocket interventions.

- **Embed ESD in public financial management systems**, with clear tracking of inputs, outputs and outcomes, as part of a larger Monitoring and Evaluation (M&E) strategy. Leverage technology, such as education management information systems (EMIS), to ensure funds are used effectively and equitably.

6.2.6 Continuous Monitoring, Evaluation, and Support

Monitoring and Evaluation (M&E) is critical to ensuring that the ESD Educator Training Programme is implemented effectively and generates the intended transformation in educator practice, school culture, and learner development. M&E serves as a compass for continuous improvement, revealing what works, what doesn't, and why. It enables accountability, adaptive learning, and evidence-based scaling of effective models. In a rapidly evolving education landscape, strong M&E also provides the credibility and rigor needed to secure sustained investment and policy support.

A robust impact measurement framework for educator capacity-building and pedagogy reform, structured around key domains and methodologies, will generate the evidence-based insights that will enable the optimisation of targeted actions: learning equity and real outcomes for schools and learners.

Supporting Recommendation

- **Emphasise M&E throughout programme roll-out.** M&E has already been embedded within the pilot programme, with defined indicators and prescribed data collection tools to ensure alignment with intended outcomes. A suggested framework, with indicators and measurement tools, is provided in Table 13 below.

- **Develop M&E Champions** amongst qualified educator trainers to promote, coordinate, carry out, and periodically review M&E efforts.
- **Encourage the sharing of real-time data** to produce insights and enable reflection and adaptation. Digital tools can create feedback loops, and dashboards can support trainers and policymakers in making agile, informed decisions.

- **Integrate insights generated through M&E into teacher learning communities, performance reviews, and mentoring systems**, emphasising outcomes and impact rather than numbers.

M&E Domain	Outcome	Measurement Parameters	Measurement Tools
Teacher Competency Development	Teachers gain ESD competencies (knowledge, values, and pedagogical skills)	1. Participant engagement rates 2. Change in sustainability mindset 3. Attainment of competencies from training 4. Confidence levels in using ESD approaches 5. Integration of ESD in classroom and school activities	1. Facilitator observation reports 2. Pre- and post-training survey questionnaires /FGDs 3. Rubric-based assessments 4. Participant reflective logs/ interviews FGDs 5. Lesson plan / school activity reviews / classroom observation
Institutional Enablers and Culture Shift	Schools foster a supportive environment for ESD	6. Perception of leadership support 7. Collaboration among staff 8. Behavioural changes (e.g. professionalism) 9. Existence and knowledge of ESD policies/ strategies	1. Pulse surveys 2. Educator interviews/ FGDs 3. School strategic action plan reviews
Classroom Practice and Learner Outcomes	ESD-aligned pedagogy is used and student learning improves	1. Changes in learner ESD competency rates 2. Student engagement in sustainability 3. Level of ESD embeddedness in lessons	1. Rubric-based assessments 2. Longitudinal test result comparison 3. Classroom observation 4. Student survey questionnaires/ FGDs
Stakeholder Engagement and System Alignment	Beneficial engagement with parents and community, and alignment with societal changes	1. Level of real-world problem solving in learning (living labs) 2. Level of meaningful community partnerships established 3. Parental participation level in school activities	1. Stakeholder interviews 2. Parent surveys 3. Analysis of outcomes of partnerships 4. Analysis of fundraising and utilisation

TABLE 14: Suggested M&E Framework

6.3 Conclusion

As Malaysia deepens its education transformation agenda, with the impending release of its next Malaysia Education Blueprint (MEB) 2026-2035, embedding ESD values, practices, and competencies across all schools becomes both a strategic imperative and a moral commitment.

To support this national ambition, SDSN reaffirms its commitment to support Malaysia in this journey – not just as a technical partner, but as an ally invested in transformative, context-rooted, and quality- and equity-driven change. By scaling educator training with rigour, high-quality resources, and data-driven decision-making, we can build an education system that prepares every learner in Malaysia to shape a more just, inclusive, prosperous, and sustainable future. SDSN is ready to work closely with the Ministry of Education, teacher training institutes, and other partners to accelerate the nationwide implementation of high-quality ESD professional development. In particular, SDSN, as a party to the National ESD & GCED Strategic Alliance, will work collaboratively towards a National ESD Action Plan that can be incorporated into the next MEB.

SDSN's support could focus on three critical dimensions:

- Training of Trainers (ToT) - to build a cadre of national and subnational master trainers equipped with advanced ESD competencies, learning strategies, facilitation skills, and culturally responsive approaches to localise and scale training with quality and fidelity.

- Resource Development - to make available training materials tailored to the Malaysian context, including educator training manuals and facilitator guides, reflection logs, presentation decks, and curated links to resource repositories and practice-based toolkits on pedagogies such as inquiry-based learning, systems thinking, and transdisciplinary learning.

- Monitoring & Evaluation Tools - to embed an M&E system for ESD educator training and implementation, including indicators and tools aligned with teacher competencies and learner outcomes, feedback platforms to enable data-informed improvement, and dashboards for district and national-level progress monitoring.

At the heart of this transformation is the educator: empowered, inspired, and equipped to lead change from within classrooms and alongside communities. Yet, achieving Malaysia's ESD vision requires more than educator training alone. It calls for a coordinated national effort, anchored by shared purpose, collective leadership, supportive organisational culture, shared ownership, and mutual commitment.

Working together, each segment of society can play a part in helping to equip every educator to become an ESD champion and every school to become a hub of national transformation.

Appendix A

Original Quotes before Translation

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4.1.1. Objective 1 Qualitative Insight

Has Not Acquired a SD Mindset Responses are general	Moving Towards a SD Mindset Responses indicate some context of practice	SD Inclined Mindset Responses indicate specific context of practice
Menjaga Alam Sekitar *Sayang bumi* *Melalui program kitar semula* *Membuat kutipan barang kitar semula* *Alam Yang bersih* *Tanggung jawab & pemuliharaan* *Mengasingkan sampah* *Penggunaan sumber mampan, perubahan iklim*	*Kepentingan menjaga keseimbangan ekosistem* *Teaching the importance of nature and the consequences if not preserved* *Mengekalkan sumber yang sedia ada dan memperbaharui sumber yang berkurang* *Tidak membazir dan cara penjimatan electric serta kesan masa depan* *Cuba menggunakan bekas makanan dan minuman sendiri semasa membeli makanan.*	*Setiap tindakan yang kita lakukan setiap hari memberi kesan kepada keadaan persekitaran kita.* *Mengasingkan bahan buangan di rumah kepada sisa yg boleh dikitar semula dengan yang tidak. Kurang gunakan tisu (guna kain lap). Save electricity. Save water. No polystyrene.* *Mengamalkan kitar semula, kompos, dan mengurangkan penggunaan plastik sekali guna. Saya juga berusaha untuk membeli produk yang mempunyai pembungkusan minimal dan boleh dikitar semula.* *Mengambil tanggungjawab untuk mengurangkan pencemaran, penebangan hutan, dan pembaziran sumber.*

TABLE 9: Personal log after Module 1, Reflection 4 responses on sustainability mindsets

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4.2.1 Objective 2 Qualitative Insight

Competency: Learning to Know (Sample Excerpts)
The consequences of mercury pollution were catastrophic. Fish-eating birds, such as seabirds and raptors experienced population declines, symbolised by the eerie silence as birds stopped singing. Meanwhile, the local human population suffered from severe health effects, including neurological disorders, birth defects, and deaths. (Overall Feedback after Module 2)
Dengan pengetahuan tentang keadaan tempatan, guru boleh memberikan contoh praktikal yang lebih relevan dan membantu pelajar melihat hubungan antara konsep global dan isu tempatan (Post Module 2 Survey, Open-ended Question 4)
Pendidikan ini bukan sahaja tentang pemahaman saintifik terhadap alam sekitar tetapi juga tentang nilai-nilai etika, seperti empati terhadap generasi akan datang, dan tanggungjawab terhadap komuniti yang kurang bernasib baik. (Post Module 3 Survey, Open-ended Question 2)
Competency: Learning to Live Together (Sample Excerpts)
Ya akan berjaya – Projek seperti ini bukan sahaja menarik minat pelajar, tetapi juga menggalakkan penglibatan aktif daripada mereka. *Contoh: Taman sekolah adalah ruang fizikal yang boleh dilihat dan dijaga oleh pelajar setiap hari, yang mana ini membantu mereka melihat hasil kerja mereka secara langsung.* (Post Module 2 Survey, Open-ended Question 7)
.. kita semua perlu memainkan peranan untuk menjaga dan melindunginya. Ini termasuk mengamalkan gaya hidup yang lebih lestari, seperti mengurangkan penggunaan plastik, mengitar semula, meminimalkan sisa, serta menyokong dasar dan undang-undang yang menyokong pemuliharaan alam. (Personal Log After Module 2, Reflection 1b)
Competency: Learning to Be (Sample Excerpts)
Saya perlu lebih prihatin dan yakin untuk meletakkan mindset dan melaksanakan apa yang telah dipelajari. Amalkan sifat kemampanan, say no to bag plastic. Perlu mulakan dengan diri sendiri barulah mengubah mindset pelajar. (Personal Log After Module 2, Question 4 Overall Feedback)
Sekarang saya sedar bahawa ramai rakyat, termasuk ramai guru-guru, tidak arif dan prihatin terhadap permasalahan di atas. Ada juga yang menyalahkan warga asing, ada yang berpendapat kita sudah cukup berpendidikan dalam hal ini, dan ada juga yang tidak kisah sama sekali terhadap isu-isu di atas. (Post Module 1 Survey, Open-ended Question 4)
Competency: Learning to Do (Sample Excerpts)

Ya, kerana pengabungjalinan antara matapelajaran dapat memberikan input yang banyak kepada guru dan murid serta boleh dikaitkan dengan kehidupan seharian. (Post Module 2 Survey, Open-ended Question 7)

Saya perlu lebih prihatin dan yakin untuk meletakkan mindset dan melaksanakan apa yang telah dipelajari. Amalkan sifat kemampanan, say no to bag plastic. Perlu mulakan dengan diri sendiribarulah mengubah mindset pelajar. (Personal Log After Module 2, Question 4 Overall Feedback)

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4.3.1 Objective 3 Qualitative Insight

"Merancang pengajaran yang merentas disiplin memerlukan lebih banyak masa untuk berkolaborasi, bertukar idea, dan membina pelan pengajaran yang menyokong pelbagai subjek. Kekangan masa boleh menjadi isu besar, terutamanya apabila jadual kerja sudah padat. Perbezaan Gaya Pengajaran: Setiap guru mungkin mempunyai pendekatan pengajaran yang berbeza, dan menyesuaikan gaya pengajaran yang sesuai untuk pelbagai mata pelajaran boleh menjadi cabaran. Sebahagian guru mungkin lebih cenderung menggunakan kaedah tradisional, manakala yang lain mungkin lebih terbuka kepada

"Bahasa Melayu dengan Seni' Contoh: Kitaran sampah dengan lukisan"

"Melestarikan alam dalam Bahasa Melayu dan Bahasa Tamil"

"Topik Sukatan Kecenderungan Memusat bagi matematik tingkatan 2 boleh diajar secara berkolaborasi dengan mata pelajaran Sains, Sejarah, Geografi, Pendidikan Islam. Contoh Berkaitan dengan isu alam sekitar...pembuangan sampah yang tidak teratur boleh menyebabkan pencemaran alam sekitar. Topik Sukatan Kecenderungan memusat dapat digunakan dalam mengesan kawasan yang paling dan kurang tercemar atau bahan buangan yang manakah paling banyak menyumbang kepada pencemaran. Kesan pencemaran tersebut boleh dibincangkan dalam subjek yang tersenarai di atas." (Post-Module 3 Survey, Open-ended Question 2)

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4.4.1 Objective 4 Qualitative Insight

“Projek inovasi sains JPWPKl dan pertandingan gispro . . .”

“Gotong-royong Madani”

“Young Scientist, Sains Fair”

“Go Green Program - International level, Guiness record”

**“ASTI - Science Fair peringkat Kebangsaan, Persembahan Bercerita - Universiti Malaya”*

**“Program Kebajikan Murid B40”*

(Pre-Module 4 Survey, Open-ended Questions 1-4)

“Ya, banyak sekolah bekerjasama dengan NGO seperti WWF atau MNS untuk menjalankan program kelestarian. Contoh: Sekolah boleh bekerjasama dengan WWF Malaysia untuk mengadakan program "Hari Alam Sekitar" yang melibatkan aktiviti pendidikan tentang pemeliharaan biodiversiti. Program ini mungkin termasuk ceramah, bengkel, dan aktiviti lapangan, di mana pelajar belajar tentang kepentingan menjaga alam sekitar. NGO juga dapat menyediakan bahan pendidikan dan sumber lain untuk menyokong aktiviti ini. Kerjasama ini memperluas pengetahuan pelajar dan meningkatkan kesedaran mereka tentang isu kelestarian.” (Post-Module 4 Survey, Open-ended Question 3)

“Ya, banyak sekolah mengambil bahagian dalam program kelestarian bersifat global seperti "Earth Hour" atau "Global Climate Strike". Contoh: Sekolah mungkin menyertai "Earth Hour" dengan mengadakan aktiviti seperti mematikan lampu selama satu jam dan mengadakan perbincangan tentang kepentingan penjimatan tenaga. Pelajar juga boleh terlibat dalam kempen kesedaran melalui poster dan persembahan...” (Post-Module 4 Survey, Open-ended Question 4)

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5.1.1 Realising the importance of ESD

"ESD is the next step to prevent a bad future." (Personal Log after Module 2, Reflection 1b)

"ESD adalah Langkah (sic) seterusnya untuk mengelakkan masa depan yang buruk." (Personal Log after Module 2, Reflection 1b)

"Bagi pandangan saya kita perlu amalkan di sekolah supaya anak murid kita dapat mengekalkan kesuburan Alam Sekitar pada masa akan dating." (Personal Log after Module 2, Reflection 2)

"Modul yang baik untuk pengetahuan." (Overall Feedback after Module 2)

"Saya…perlu mulakan dengan diri sendiri, barulah mengubah mindset pelajar." (Overall Feedback after Module 2)

"Setelah mengikuti program Latihan Guru dalam ESD, saya merasakan kesedaran kepentingan alam sekitar dalam diri pelajar amat penting dan perlu diterapkan di sekolah." (End of Programme Commitment Survey)

"Kerana ESD sangat menarik Dan (sic) dapat membantu proses PDPC menjadi lebih berkesan." (End of Programme Commitment Survey)

"Jawapan saya berbeza apabila saya mula menyedari kepentingan pendidikan dalam mengubah perspektif masyarakat. Guru boleh menjadi ejen pengubah seperti Rachel Carson." (Post Module 1, Question 4)

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5.1.2 Practicing the 4 core ESD competencies

"Menarik. Memberi idea untuk digunakan dalam kelas." (Overall Feedback after Module 2)

"Modul yang baik untuk pengetahuan." (Overall Feedback after Module 2)

"Sesi, sangat memberi kesan positif terhadap diri saya dalam Pendidikan mampan." (Overall Feedback after Module 2)

"Yes, after completing this training, I will utilise the knowledge gained about ESD to change my teaching approach. I aim to incorporate sustainability concepts into my lessons, engage students in critical discussions about environmental issues, and implement project-based learning that promotes practical applications of sustainability. This shift will help foster a more holistic understanding of sustainable development among students, encouraging them to take action in their communities." (End of Programme Commitment Survey)

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5.1.3 Transformative pedagogies

"Saya berpendapat bahawa perancangan aktiviti sekolah antara disiplin adalah pendekatan yang sangat berkesan dan penting dalam Pendidikan moden. Pendekatan ini memberikan pelajar peluang untuk melihat bagaimana pelbagai disiplin ilmu saling berkait rapat dan membina pemahaman yang lebih mendalam dan holistic terhadap dunia di sekeliling mereka." (Post-Module 2, Question 5)

"Pengintegrasian pelbagai bidang dalam aktiviti pembelajaran….menggalakkan amalan berpaksikan Pembangunan mampan." (Post-Module 2, Question 6)

"Sesuai untuk tranformasi (sic) yang diperlukan." (End of Programme Commitment Survey)

"Kolaborasi ini membolehkan pelajar memahami tema Pembangunan Mampan dari pelbagai perspektif, merangsang pemikiran kritis dan tindakan positif terhadap alam sekitar." (Post-Module 3, Question 2)

5.1.4 Caring for future generations

"Demi generasi masa depan." (End of Programme Commitment Survey)

"Pendekatan ini menekankan keperluan untuk membuat keputusan yang seimbang dan bertanggungjawab, dengan mengambil kira kelestarian sumber alam, keadilan sosial, dan kestabilan ekonomi, demi memastikan kesejahteraan generasi masa kini dan masa depan." (Personal Log after Module 1, Reflection 4)

"Pengintegrasian pemikiran kelestarian dalam pendidikan tinggi dapat diteruskan agar generasi masa hadapan berupaya menyelesaikan masalah yang kompleks secara Lestari." (Personal Log after Module 1, Reflection 5)

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5.2.2 Attitudes and behaviours

“Attitude” towards professional development programmes:

“One teacher expressed that teachers are very busy. At times they have no time to eat, so much work to do. They are asked to do this and that, so they really find it a burden to answer Google Surveys and fill up Personal Logs for our sessions.” (O, School 1, Session 3, 6 May 2024)

“Another teacher asked that we just provide the activities according to the different subjects we want them to do in class and they will do it.” (O, School 1, Session 3, 6 May 2024)

“Banyak aktiviti memerlukan HOTs. Waktu selepas kerja pada kami sangat memenatkan untuk pelbagai aktiviti. Kami hanya nak tahu apa perlu kami buat untuk mengubah generasi dan bagi kami cadangan bagaimana nak aplikasi pengetahuan kepada murid kami.” (Overall Feedback after Module 2)

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5.3 Understanding Professionalism and Teaching as a Profession

Time constraint, lack of expertise:

“Kekangan masa dan cara melaksanakan dengan efektif adalah cabaran untuk transformative pedagogies.” (Personal Log after Module 3)

“Setiap guru biasanya mempunyai kepakaran dalam subjek tertentu dan menggabungkan dua atau lebih mata pelajaran memerlukan penyelarasan yang teliti antar guru. Kadang-kadang guru mungkin tidak mempunyai pengetahuan yang mendalam dalam bidan (sic) lain – mentebabkan (sic) kesukaran dalam merancang aktiviti PdP yang berkesan.” (Personal Log after Module 3)

“Learning to Do, agak susah untuk dilakukan 100% pada generasi guru senior sekarang.” (Personal Log, Module 2, Reflection 3b)

“The activity (during one of the sessions) required them to imagine a class in the year 2035. But they stuck to present methods of teaching – no future pedagogical plan was put forward. Could be they are very used to directly transferring important facts and concepts to their students. Did not see any ’thinking outside the box.’” (O, School 4, Session 2, 10 August 2024)

“Kerana kita tidak dapat mendidik murid melalui pendekatan ini.” (End of Programme Commitment Survey)

“Rutin sekolah yang padat sering menyebabkan guru kekurangan masa untuk merancang dan melaksanakan kolaborasi.” (Personal Log after Module 4, Reflection 2)

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Finishing-the-syllabus syndrome:

"Saya terlalu sibuk dengan silibus SPM dan memegang beberapa portfolio yang agak berat." (End of Programme Commitment Survey)

"Beban kerja telah terlalu banyak disekolah. Tidak mahu menambah komitmen yang lain. Ingin lebih tumpuan menghabiskan silibus yang banyak dan rencam." (End of Programme Commitment Survey)

"Guru ingin mengejar Silibus." (Personal Log after Module 3)

"One teacher said that ESD class lessons and project work is a lot of extra work." (O, School 1, Session 3, 20 May 2024)

"When asked if they tried out any ideas in their classroom after sessions 1 and 2, the answer was 'No,' as they had no time and had to finish the syllabus." (O, School 3, Session 3, 12 June 2024)

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No interest and not motivated to be involved in ESD:

"Tidak berminat." (End of Programme Commitment Survey)

"Komitmen terhadap keluarga." (End of Programme Commitment Survey)

"Tidak berminat kerana komitmen tugas yang banyak di sekolah." (End of Programme Commitment Survey)

"Kami sedar akibat masa depan tetapi kurang motivasi." (Personal Log after Module 1, Reflection 5)

Appendix B
Selected Case Studies of Model Schools

The case studies below are existing models of schools already successfully integrating ESD in learning environments. These schools demonstrate interdisciplinary teaching methods, community engagement, and sustainable practices that foster responsible citizenship. These institutions and leaders also implement curriculum enhancements, applied learning, and partnerships that align with global sustainability goals. By examining their successes, this section presents several practical applications as a reference for adaptation towards creating an education system that equips students with the competencies (knowledge, skills, attitudes, and values) needed for a sustainable future.

The model schools presented below are:

1. Le Thi Hong Gam High School (District 3, Vietnam)
2. Sagano High School (Kyoto, Japan)
3. Hwa Chong Institution (Singapore)
4. SJK (T) Sungai Ara (Penang, Malaysia)

1. Le Thi Hong Gam High School (District 3, Vietnam)

Le Thi Hong Gam High School, located in District 3, Vietnam, is a public institution recognised for its innovative use of interdisciplinary projects to enhance student learning. The school is committed to developing well-rounded students who can think critically and apply knowledge across subjects.

What They Do

The school integrates interdisciplinary projects into its curriculum, encouraging students to connect knowledge from various subjects such as science, mathematics, and literature to solve real-world problems. These projects are designed to foster critical thinking, creativity, and collaboration.

In Vietnamese culture, teachers are highly regarded as influential figures and are very involved in student development across disciplines, prioritizsing character building and confidence in students alongside knowledge sharing.

The school also blends in the deep history and culture of Ho Chi Minh even in STEM subjects to help students relate to issues and lessons.

“Previously, I only knew that Agent Orange was harmful to our people, but when I studied it from a biochemical perspective, I understood the structure and reactions of the substances, why it left serious consequences for future generations, and from there I became even more grateful for the sacrifices of my ancestors,” Uyen Phuong shared after 1 month of preparation and research (Thanh Nien Newspaper, 2024).

How They Do It

Students work on projects that combine multiple disciplines, such as creating environmental action plans that integrate science, geography, and civic studies.

Teachers from different departments collaborate to design and guide interdisciplinary projects, ensuring alignment with the curriculum.

The school also involves local communities and experts in projects, such as inviting environmental scientists to mentor students or organising community clean-up initiatives. Digital tools and platforms are used to facilitate research, collaboration, and presentation of project outcomes.

Where Resources Come From
The school is supported by the Vietnamese Ministry of Education and Training to implement interdisciplinary programs. Collaborations with local organisations and businesses provide additional resources and expertise. Parents often support the school's initiatives through volunteering and donations.
Data to Support
Surveys show that 85% of students find interdisciplinary projects more engaging than traditional lessons. Students participating in these projects demonstrated a 20% improvement in problem-solving skills and a 15% increase in test scores in science and humanities subjects. Projects like the "Clean District 3" campaign resulted in over 1,000kg of waste being collected and a 30% reduction in local littering.

More about Le Thi Hong Gam High School.

2. Sagano High School (Kyoto, Japan)
Sagano High School, Kyoto, Japan, is a designated Super Science High School and Super Global High School, known for its interdisciplinary approach to education and emphasis on global competencies.
What They Do
The school integrates STEM education with global studies to develop students' critical thinking, innovation, and cultural awareness. Students conduct advanced research and engage in international collaboration.

How They Do It

Students work on interdisciplinary projects involving physics, biology, and environmental science.

Partnerships with schools and organisations abroad allow students to collaborate on global challenges.

Teachers from various disciplines co-design curriculum modules that align with real-world problems.

Students explore the intersection of science and cultural heritage in projects such as sustainable tourism and historical site preservation.

Where Resources Come From

Funding from the Ministry of Education, Culture, Sports, Science and Technology (MEXT) for advanced research and international programs.

Collaborations with Kyoto University and other research institutions provide expertise and facilities.

Local businesses and cultural organisations contribute to specific projects.

Data to Support

Students show a 25% improvement in interdisciplinary problem-solving skills.

Sagano students have presented at international conferences and participated in global competitions.

Projects on sustainable tourism have led to increased awareness and preservation efforts in Kyoto.

More about Sagano High School.

3. Hwa Chong Institution, Singapore

Hwa Chong Institution is one of Singapore's leading independent schools. A Ministry of Education-designated Future School, HCI has been a top feeder school for international students to the University of Oxford and University of Cambridge. The institution is also a member of the Global Learning Alliance, which involves some of the world's most innovative schools from the highest performing nations, including Australia, Canada, China, Finland, New Zealand, and Sweden.

What They Do

The school integrates STEM with humanities through project-based learning. For example, students work on sustainability projects combining biology, economics, and design thinking. They run an "Applied Learning Programme" where students tackle real-world challenges, such as urban planning and renewable energy.

HCI also offers a Bicultural Studies Programme, a high-tech Art Elective Programme, and a Science and Math Talent Programme, all of which offer a degree of specialisation not possible in the standard curriculum, enabling students to thrive in these specialised fields at university level locally and abroad.

How They Do It	
Singapore's Ministry of Education encourages autonomy for top-performing schools to innovate within broad guidelines. Teachers receive ongoing training in interdisciplinary pedagogy and technology integration. The school encourages cross-disciplinary projects where students explore topics like climate change, poverty, and technological ethics through the lenses of history, geography, science, and philosophy Annual symposia and exhibitions showcase student research and innovations. 	
Where Resources Come From	HCI is government-aided and also has a large and active alumni network. Alumni often donate funds to support scholarships, infrastructure upgrades, and special projects. Financial statements are publicly viewable here.
Data to Support	With a team of educators dedicated to ensuring teaching and learning stays relevant with the changing times, HCI students have maintained the school's tradition of receiving numerous offers and scholarships from the most prestigious universities in the world to programmes designed to nurture interdisciplinary thinkers, changemakers, and future leaders for the nation.

More about the Hwa Chong Institution.

4. SJK (T) Sungai Ara (Penang, Malaysia)

School leadership is pivotal in advancing ESD. Exceptional leadership is shown to drive systemic changes throughout a school, thereby fostering the enabling environment for all stakeholders to participate in transformation. Mr Sangga Sinnayah, Headmaster from 2011–2019, is the embodiment of such leadership.

What They Do

Integrated the SDGs into the school's daily operations.

Implemented outdoor and experiential learning.

The school practiced resource conservation. Students and teachers bring their own water bottles and food containers to avoid single use-plastics. The canteen produces less than a half-kilogram of food waste each day.

Under Mr Sinnayah's leadership, the school implemented various eco-friendly initiatives, including the development of an organic farm that not only served as a practical learning platform for science education, but also generated a monthly income of approximately RM600 for the school.

How They Do It

Mr Sinnayah formally incorporated SDG elements into teachers' lesson planning, where teachers were required to then incorporate them into their classes, while giving them the freedom to explore further adaptations as they saw fit.

Referring to his students as his "children," Mr Sinnayah's efforts to turn his students into changemakers led to an engaging learning environment and increased school attendance. Through a whole-school approach, positive behavioral changes were observed, as students had more of an interest in learning and participating in sustainable development educational activities even outside of class hours.

Where Resources Come From
Government-aided. The school also raises funds from the wider community and via the parent-teacher association.
Data to Support
Deemed a “model school” that other institutions should emulate by the then-Malaysian Minister of Education. Mr Sinnayah’s journey has been carried in the media and the students of SJK (T) Sungai Ara have been referred to as “Eco-Warriors.” The students’ interest in learning saw improvements in the school’s academic performance. It became one of the state’s top schools, with an 86% passing rate, as reported by Aliran in 2019.

More about SJK (T) Sungai Ara.

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Launched in December 2020, Mission 4.7 is a global initiative of the UN Sustainable Development Solutions Network (SDSN) to advance Target 7 of Sustainable Development Goal 4 globally by promoting Education for Sustainable Development (ESD) and Global Citizenship.

This is a report of a pilot educator training programme to mainstream ESD in Malaysian public primary and secondary schools. The intervention was designed and developed by SDSN's Asia Headquarters, based on Malaysia's ESD status within its current policy and practices. We highlight the impact of the intervention, offer insights on transforming educators for ESD delivery, and propose a way forward for Malaysia to deliver ESD at-scale.

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