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EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD):
IMPLEMENTATIONS IN HIGHER EDUCATION (HE) AND CHALLENGES

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MAYIS-2024

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ÖZET

EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD): IMPLEMENTATIONS IN HIGHER EDUCATION (HE) AND CHALLENGES

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Sakarya Üniversitesi, 2024.

Sürdürülebilir Kalkınma için Eğitim (ESD), öğrencilerin yaşamlarında sürdürülebilir bir davranış zihniyetini teşvik etmek ve geliştirmek için eğitim sistemini her düzeyde radikalleştirmeye dayanan nispeten yeni bir kavramdır. SKE için eğitim sistemlerini sistematik olarak anlamak ve değiştirmek için, gelecek nesillerin yaşam tarzlarında beslenebilmesi için sürdürülebilirliğin kapsamlı bir şekilde anlaşılması gerekir. Yüksek öğretim (HE) kurumları SKE'de önemli bir rol oynamaktadır, çünkü bu seviyedeki öğrenciler çalışma alanına girmenin ve becerilerini toplumlarına sunmanın eşliğindedirler. Bu makalenin temel amacı, SKE'nin yüksek öğretimde nasıl uygulanabileceğini ve beraberinde getirdiği engel ve zorlukların neler olduğunu belirlemektir.

Anahtar Kelimeler:

Sürdürülebilirlik, Sürdürülebilir kalkınma, Sürdürülebilir kalkınma için eğitim, Yüksek öğrenim, Sürdürülebilir kalkınma hedefleri

ABSTRACT

EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD): IMPLEMENTATIONS IN HIGHER EDUCATION (HE) AND CHALLENGES

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Education for Sustainable Development (ESD) is a relatively new concept based on radicalizing the education system at all levels to promote and foster a sustainable behavior mentality in the lives of learners. To systematically understand and change education systems for ESD, a thorough understanding of sustainability is required so that it can be nurtured in the lifestyle of future generations. Higher education (HE) institutions play a major role in ESD as learners at this level are on the doors of entering the work field and offering their skills to their society. The main purpose of this paper is to identify how ESD can be implemented in higher education and what the barriers are and challenges it brings along.

Keywords:

Sustainability, Sustainable development, Education for sustainable development, Higher education, Sustainable development goals

TABLE OF CONTENTS

CHAPTER 1	1
INTRODUCTION	1
1.1 Background	1
1.2 Research Problem	5
1.3 Research Purpose	7
1.4 Research Limitations	7
1.5 Definition of Terms	8
CHAPTER 2	9
2.1 Sustainability	9
2.2 Sustainable Development	11
2.3 Education and Sustainability	13
2.4 ESD in Higher Education	18
2.5 Importance of ESD in HE	19
2.6 How can Sustainable Development be Integrated into the Curricula?	21
2.7 Countries that have integrated ESD.	25
2.7.1 Japan	25
2.7.2 Germany	27
2.7.3 Sweden	27
2.7.4 South Africa	28
2.7.5 Brazil	29
2.7.6 Canada	29
2.7.7 United Kingdom	30
Table 1.1: ESD Implementation in Selected Countries	31
2.8 Educators' Competencies for ESD	33

2.9 Implications of ESD in Higher Education	35
CHAPTER 3	37
METHODOLOGY	37
CHAPTER 4	41
FINDINGS	41
4.2: Spain	43
4.3: Qatar	45
4.4: Japan.....	47
4.5: Sweden	49
4.6: Malaysia	51
4.7: United States	54
4.8: India	56
4.9 Nigeria.....	58
4.10: Lebanon.....	59
Table 1.2: ESD Implementation in Higher Education: A Global Comparison.....	61
CHAPTER 5	64
RESULTS, DISCUSSION AND SUGGESTIONS	64
5.1. Results and Discussion.....	64
5.1.1. Best Practices	64
5.1.2. Challenges faced	68
5.2. Suggestions.....	71
5.2.1. Suggestions based on Results.	72
5.2.2 Suggestions for Future research	73
REFERENCES.....	76

CHAPTER 1

INTRODUCTION

1.1 Background

Sustainable Development (SD) has become a popular concept in current development discourse (Sterling, 2010). The term was first presented in 1987 in the Brundtland Report. Finding a balance between environmental conservation and economic growth in social, political, economic, and technological systems without posing any obstacles was emphasized in the Brundtland Report (Elliott, 2006).

SD was considered as a potential alternative to Neoliberalism, which promotes capitalism and the free market system for development. Individual well-being, as well as many societal challenges, such as improving livelihoods, meeting fundamental human needs and freedoms, protecting the environment, and promoting sustainable economic development, have now been prioritized (Payne and Phillips, 2010; Rydzewski, 2018).

Sustainable development is an important societal aim, and there is widespread agreement that education is critical to accomplishing it. As a result, education for sustainable development strives to provide people with action competence for sustainability, i.e. individuals who can act and contribute to the creation of sustainable development. It develops skills, attitudes, behaviors, and ways of thinking that will prepare our children to be reflective, engaged, and sympathetic citizens. It prepares pupils to think systemically, react critically and creatively, gain skills, and meet the challenges of making a better world.

Perspectives have broadened, and global issues are now being addressed in the classroom. Environmental challenges show intricate relationships, which include what we refer to as sustainability issues as well as questions regarding the interaction between society and nature from various perspectives. Complexity, ambiguity, and necessity characterize education in the context of sustainability challenges (Jonsson, 2008; Scott and Gough, 2003; Van Poeck and Vandenabeele, 2012).

Marin, Dorobanțu, Codreanu, and Mihaela (2012) similarly assert that SD involves the ability of a system to run continuously and indefinitely without reaching resource depletion. Targeting SD issues among all sectors of development through a well devised plan is seen

as an achievable outcome. The belief that environmental, social, and economic goals can be sustainably achieved was a glimmer of hope for societies (Mensah, 2019; Weitz, Carlsen, Nilsson, and Skånberg, 2017).

The Earth Summit in 1992 solidified the trend toward sustainable development, which had been popularized by the Brundtland Report. The most significant outcome of the Earth Summit was Agenda 21, which produced a set of proposals and objectives aimed at reversing the process of environmental degradation and recommending that national strategies be designed and developed to address the economic, social, and environmental aspects of SD (Allen et al., 2018).

Although Agenda 21 was criticized for being largely shaped by northern elites, the hope was that these proposals, which included several concepts, would serve as a reconciliation between the environment and the economy, aimed at human progress on a global scale and over time.

Agenda 21's promotion of public participation does not guarantee solutions to societal sustainability concerns. For example, Jacobs (1999) discusses how Agenda 21 considers sustainability issues as science-based and easily handled. This assumption can be problematic, especially if public consensus is flawed and policies made are socially acceptable but not sustainable. According to Domańska, Żukowska, and Zajkowski (2019), addressing gender disparity is crucial for achieving sustainable development. As a result, it was determined that public involvement needed to be linked with some type of ESD (de Haan, 2010).

The Earth Summit acknowledged that education could play an important role in tying sustainability to economic well-being and providing individuals with the tools they needed to participate in addressing sustainability issues actively and meaningfully. Such skill development is vital since it is still required to address human social and economic needs while also contributing to environmental protection (Borg, Gericke, Höglund, and Bergman, 2014).

ESD would refocus human behavior away from merely economic and material purposes and toward broader human and environmental requirements (Doyle, 1998; Irwin and Lotz-Sisitka, 2005). Because humans are the agents, beneficiaries, and mediators of progress, how they are educated has an impact on how society develops to address development concerns. Education has an important role in linking sustainability to economic well-being and prepar-

ing pupils for an uncertain future (UNESCO, 2007). Thus, education was viewed as an appropriate medium for promoting and achieving sustainability (UNESCO, 2020). Education is required to ensure the SDGs' long-term effectiveness.

Teachers should instill in their students the required environmentally friendly beliefs and attitudes to modify their behavior and so assist an ecologically friendly transformation of society. The normative tradition is founded on a causal relationship between environmental problem understanding, ecologically friendly values, and environmentally friendly conduct.

The teaching process and students' experiences are emphasized to enhance the intended outcomes of education. During the 1990s, environmental guidelines such as biodiversity, recycling, environmental certification, and greenhouse gases were all in the spotlight (Peterson, 2012).

Sustainable development is understood to have three dimensions: ecological, social, and economic (WCED, 1987), and there is now widespread agreement that it must be conceptualized as multidimensional, with equal dimensions (Giddings et al., 2002; Lehtonen, 2004). While the ecological dimension is often emphasized, the social dimension is the most contentious and poorly understood. Environmental considerations have a higher influence on the establishment of sustainable development than social and economic issues (Svalfors, 2018).

According to a multidimensional vision of sustainable development, educational strategies frequently emphasize cross-curricular or holistic practices. Furthermore, the educational dimension contends that schools must provide overarching cross-curricular perspectives on complex subjects such as sustainable development, creating conditions for students to develop the ability to make their own individual decisions (Lozano et al., 2013).

Education is highlighted as one of the important solutions and identified as necessary for reaching sustainable development goals (Boström et al., 2018). Education for sustainable development (ESD) is education that strives to be one of the contributors in achieving sustainable development. Compared to environmental education, which strictly focuses on information on the ecological dimension, ESD is integral to sustainable development (Sund and Wickman, 2008).

A significant aspect is that education in this context is a component of long-term growth rather than a means to an end. ESD varies from traditional educational practices that emphasize passive assimilation, the repetition of given truths, and the preservation of the current social order (Stevenson, 2007).

Higher education institutions (HEIs) have recently launched several initiatives that incorporate sustainable development (SD) using a variety of techniques (Lozano et al., 2013a; Hoover and Harder, 2014). Some attempts focus on developing implementation models for a single institution or university program (Lambrechts et al., 2009; Lukman and Glavic, 2007; Velázquez et al., 2006; Newman, 2012). These models define basic values and milestones on the way to a sustainable higher education. Other initiatives seek to improve the quality of education at a higher education institution by offering specific courses and programs that incorporate or specialize in SD (Hesselbarth and Schaltegger, 2014; Shriberg and Harris 2012).

Lozano et al. (2013) investigate and identify barriers to change and crucial success factors, especially from the standpoint of the university system. According to numerous other writers and publications, the barriers to change in higher education include a lack of SD expertise, instructor uncertainty and a risk to academic trustworthiness, fragmented course content, and a lack of support. SD was regarded to have little or no relevance to the course or discipline being taught, and the effort required to engage with and internalize SD remained unclear.

Furthermore, according to Lozano et al. (2013), university administrators and staff must be empowered to inspire and carry out novel concepts, and to guarantee that SD becomes the 'Golden Thread' across the whole educational system. Individuals' roles in successfully integrating sustainability in higher education are critical, yet they are sometimes neglected as a significant success factor.

According to Gough (2020), universities' roles include advancing research, providing teacher training programs, raising community awareness, and encouraging individual and societal responsibility. ESD in higher education helps students acquire generic sustainability competency by developing their ability to think ahead, deal with uncertainty, forecast, expect, and plan. It also aspires to produce persons who can work transdisciplinary, recognize interconnections, think with an open mind, comprehend, and cooperate across cultures, and demonstrate sympathy, empathy, and solidarity.

Globally, there is a growing demand for ESD in Higher Education Institutions. According to the 2030 Agenda for Sustainable Development, an education system is successful when it can produce long-term learners who can take on future life duties and survive in a changing society and environment (Leicht et al., 2018).

SD can be realized by a comprehensive and pluralistic approach to ESD. The former focuses theory and content-specific knowledge, whereas the latter emphasizes pedagogy. In terms of content, ESD focuses on improving conceptual knowledge of the three components of sustainability (social, economic, and environmental) and identifying connectivity between them. Pluralism is an important way to tackling sustainability concerns since it encompasses a variety of views and perspectives (Summers, 2007).

ESD aims to improve students' cognition so that they may understand the world based on their own experiences and demonstrate practical, sustainable behaviors (Saqib, 2020).

According to Wals (2014), most institutions have formed an ESD network and achieved greater levels of sustainability on their campuses and communities through strategic relationships that share experiences and technical skills.

Hoover and Harder (2014) advocate for additional research into the significance of human variables on campus, such as autonomy, interpersonal relationships, organizational cultures, and authority. Thus, variables impacting SD incorporation in higher education have been described and examined frequently by determining organizational challenges and issues, but hardly in terms of human factors, and dropping changes and evolution, as well as impacts between different challenges (Barth, 2013).

1.2 Research Problem

Education for Sustainable Development (ESD) is a strategy that encourages individuals to think about and contribute towards the growth of our future. It empowers each person to grasp the consequences of their own activities on the world and to exercise responsible judgments. However, it became obvious that tackling sustainability challenges in individual projects and education is not sufficient; it is also necessary to fundamentally initiate sustainability within organizations themselves, adopting the "step from project to structure" (Summers, 2007).

UNESCO (2014) defines ESD as "holistic and transformational education encompassing learning materials and accomplishments, pedagogy, and the instructional setting." One of the five key areas of action is "transforming learning and training environments": ESD requires much more than just preaching and teaching about sustainable development. It's also

about putting sustainable development into action. Sustainable learning environments, such as eco-schools or green campuses, allow both students and teachers to integrate sustainability ideas into their daily routines.

Updating learning and training settings entails not just administering the physical assets more sustainably, but also transforming the institution's culture and management framework. Furthermore, ESD explicitly emphasizes the role of education in supporting the SDGs, as well as thoroughly incorporating sustainable ideas into educational and training settings (Leicht et al., 2018).

ESD encourages policymakers to consider how education might help promote sustainability in the labor market and industrial sectors, beyond the intersections between ESD and content-oriented educational agendas. ESD policies and activities differ greatly from prior educational transformations in this regard, which rarely attempted to integrate educational, social, and economic policies (UNESCO, 2012a). The underlying logic of ESD is clear: fundamental behavioral and attitude changes brought about by integrated policies that best support environmental preservation, economic sustainability, and a more equitable and just society (UNESCO, 2005). As a result, ESD in higher education covers a comprehensive set of values and principles controlling educational material, which should have significant 'spill-over' impacts in society and the economy (Wals, 2014).

This paper will be exploring how ESD is integrated into the curriculum in higher education and the challenges that it brings along the way. By studying previous models of ESD implementation in higher education from 10 countries, the following research questions will be answered:

RQ1: How is Education for Sustainable Development implemented into the curriculum of higher education?

RQ2: What are the challenges of implementing Education for Sustainable Development into the curriculum of higher education?

To answer these questions secondary data analysis will be used as this paper's method. The methodology chosen allows us to have a wider insight into the way ESD is implemented and therefore provide a larger scope of analysis, conclusions, and recommendations.

1.3 Research Purpose

This paper aims to explore the strategies and techniques HE has and is still following to incorporate ESD in its system. Shedding light on the relationship between each research question and the case studies explored will help us look further into the process of its integration and its pros and cons.

Studying the implementation of ESD from multiple countries is vital for having several points of view. These previous experiences allow us to build on them and develop a more efficient system when embedding ESD in HE. Furthermore, we can conclude future recommendations for HE to best follow and obtain optimal results for our present and future.

1.4 Research Limitations

Utilizing the secondary analysis data method has brought up with it the following limitations:

- limited access of information about interviewees/ participants in the case studies analyzed.
- limited access to further details of each case study's methodology
- lack of relevant research on ESD particularly in HE

1.5 Definition of Terms

ESD: Education for Sustainable Development

HE: Higher Education

SD: Sustainable Development

SDGs: Sustainable Development Goals

UN: United Nations

UNESCO: United Nations Economic and Social Council

NGOs: Non-Governmental Organizations

SPACS-scale: Self-Perceived Action Capability for Sustainability scale

DESD: Decade of Education for Sustainable Development

GAP: Global Action Program

GCED: Global Citizenship Education

MEXT: Ministry of Education, Culture, Sports, Science and Technology

HEQC: Higher Education Quality Committee

AASHE: Advancement of Sustainability in Higher Education

CASE: Canadian Alliance of Sustainable Energy

DEFRA: Department for Environment, Food and Rural Affairs

CSCT: Curriculum, Sustainable development, Competences, Teacher training

STEM: Science, technology, engineering, and mathematics

CHAPTER 2

LITERATURE REVIEW

In this chapter, we will learn in depth about the history of sustainability, sustainable development, the emergence of Education for Sustainable Development (ESD) and ESD in Higher Education (HE). After introducing the concepts, we will learn about the characteristics of ESD according to UNESCO's draft implementation paper. Also, the importance of ESD in our individual, and social life will be investigated. We will also study the relationship between ESD and educator's role in implementing the process. Furthermore, we will examine how some countries have already adopted some strategies to include ESD in HE.

2.1 Sustainability

In many disciplines, especially ecology, the term "sustainability" is used to define a state or condition that may endure throughout time. As a result, it is an idea that has held up well over time and is still relevant today. Although sustainability was initially connected to ecological issues, it is now more frequently used in relation to development (Salas-Zapata and Ortiz-Muñoz, 2019).

According to Grober's book "Sustainability: A Cultural History," the construct of sustainability isn't an invention of modern technocrats or environmental activists, but a fundamental aspect of our cultural heritage. This contemporary ideology has profound roots and rich history. Grober argues that understanding the true meaning of sustainability requires a deep exploration of its linguistic and historical-cultural roots. Through this consideration, we can gain a greater awareness of our responsibility towards the future (Grober, 2012, p. 15).

Looking back in time, it is evident that the idea of sustainability has always been significant in European culture. The past has witnessed people appreciate nature's importance, renew their relationship with it, and investigate the link between ecology and the economy. The ongoing global crises of today has focused its attention on how society and the environment interact. People have a chance to better grasp sustainable development and to build a strong viewpoint on it because of this crisis (Grober, 2012).

In October of 1987, the United Nations (UN) released the Brundtland report, which was produced during a time of growing concern over the effectiveness of current development efforts, given the ongoing problems of poverty and ecological degradation. The report identified two primary causes of these issues: extreme poverty in certain regions of the planet, that compels people to take advantage of the earth's resources to satisfy their basic needs, and economic development in other parts of the world, which causes the unsustainable utilization of these resources (Brundtland Report, WCED 1987: 43).

The report further identified three pillars to sustainability: environment, society and economy which are sometimes referenced as Planet, People and Profit (the three Ps). The three of them were acknowledged to be interconnected and indispensable to one another (Seghezze, 2009).

The Planet pillar of sustainability, which pertains to environmental factors, involves efforts to reduce pollution, improve energy efficiency, and conserve natural resources. Environmental sustainability is built on the concept of responsible resource consumption and management and reducing waste. To ensure a sustainable accessibility of natural resources such as water and land, environmental sustainability seeks to manage and direct their use in a sustainable way (Telfer, 2012).

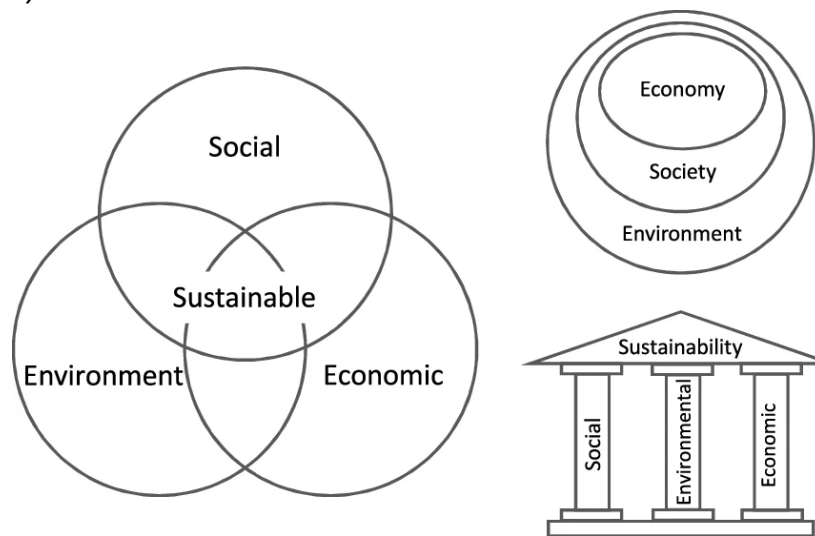
The People pillar or social sustainability is ensuring that all persons in society have equitable access to fundamental requirements. Shelter, food, safety, and healthcare are among them. It also comprises fostering gender equity and diversity, as well as improving education for all ages. Social sustainability includes the development of strong, resilient societies that can endure unexpected events (Telfer, 2012).

The final pillar is economic sustainability. This means encouraging economic development and expansion while considering social and environmental factors into account. It entails the advancement of economy in line with decreasing poverty and inequality. Economic sustainability focuses on resource management and increasing economic efficiency (Telfer, 2012).

The following figure (fig. 2.1) displays the three sustainability models that might help explain what a sustainable society looks like (Doppelt, 2012).

Figure 2.1

3 Sustainability Models



Note. This figure displays the 3 Sustainability Models by Bob Doppelt. From *The Power of Sustainable Thinking: How to create a positive future for the climate, the planet, your organization, and your life* by Bob Doppelt, 2012, Routledge.

The first widely accepted definition of sustainability employs three overlapping pillars. This triadic representation shows three overlapping rings representing society, environment, and economy are frequently, but not always, depicted with sustainability at the point of intersection. The three-legged stool metaphor emphasizes the three elements essential for a high standard of living. If one of them is weak, it proves that society is unstable. The three pillars are not at the same level, according to more sophisticated interpretations, which also accept a hierarchy in which the economy is contained within society, which is contained within the environment (Soini and Birkeland, 2014).

2.2 Sustainable Development

Early in the 1970s, Barbara Ward, founder of the International Institute for Environment and Development, is believed to be the one who coined the term 'sustainable development' (Ward and Dubos 1972). According to *A Blueprint for Survival* (Manning, 1972), a "stable society" must be able to sustain itself indefinitely while offering its members the maximum satisfaction.

Many authors began developing their theories regarding sustainable development. James Coomer believed that sustainable civilization was not a "no-growth" society but rather one that lived within the self-perpetuating boundaries of its environment. It was a culture that understood the constraints on growth, and sought out alternative possibilities for expansion (Coomer, 2016).

The following was stated in the declaration of the United Nations Conference on the Human Environment, held in Stockholm in 1972 as the first of a series of worldwide conferences on the looming ecological crisis:

"A point has been reached in history when we must shape our actions throughout the world with more prudent care for their environmental consequences. Through ignorance or indifference, we can do massive and irreversible harm to the earthly environment on which our life and well-being depend. Conversely, through fuller knowledge and wiser action, we can achieve for ourselves and our posterity a better life in an environment more in keeping with human needs and hopes . . . To defend and improve the human environment for present and future generations has become an imperative goal for mankind" (United Nations 1972).

Robert Allen (1980) defined sustainable development as "Development that is likely to produce lasting satisfaction of human needs and improvement of the quality of human life".

As mentioned in the Brundtland Report, sustainable development is satisfying the needs of the present without risking future generations' ability to meet their own. Its notion of sustainable development has demonstrated to be an important means in the debate over the environment and development. It introduced an evolving idea to a much larger audience (Elliott, 1999).

According to Paxton (1993: 2), the concept of sustainable development arose from the realization that the way to end poverty in emerging nations was not through "throughput growth," i.e., by imitating their industrialization and high consumption levels. There would be an unsustainable situation if everyone in the world consumed at that level because the Earth's limited resources could not support everyone.

By emphasizing the importance of the three pillars for society's sustainability (social, economic, and environmental) it is noticed that the dimensions are inseparable for development (Figure 1.1). Development in any of the fields should not be at the expense of the others or cause any risks to their development process. However, it was concluded that less developed regions of the world temporarily require economic growth of a different kind. The growth

needed shall be focused on human needs and considerate of environmental concerns. Instead of economic efficiency, the objective should be sufficiency (Viederman 1993: 181).

Nearly 140 developing nations are currently looking for solutions to meet their development needs, but due to the growing threat posed by climate change, proactive steps must be taken. Ongoing progress must not lead to negative impacts on future generations (*Sustainability*, n.d.).

As a result, sustainable development attempts to meet current generations' needs and well-being (particularly the needs of the poor among them) without jeopardizing future generations' ability to meet their own needs. This is done while keeping in mind the challenges of sustaining ecosystems and the constraints of renewable natural resources in mind (Keiner, 2006).

2.3 Education and Sustainability

Sustainability requires us to divide our attention and efforts into multiple fields, not just the economic one. Human well-being and needs encompass clean water and air, healthcare, and education and these are variables that must be considered when seeking a society's sustainable development. Removing obstacles faced by disadvantaged groups that live in less developed areas is a necessity. These areas usually are home to tribes, nomads and indigenous groups of people that may settle in forests, deserts or remote hills, any area that is considered as ecologically vulnerable (Soini and Birkeland, 2014).

For aeons, education was considered a public right and was stood up for. This indicates that it holds great power and potential to influence society (Daviet 2016). Hence, education proves to serve as an important factor in societal change. In that sense, it is regarded as a vital path to generate skilled persons with the potential to contribute to sustainable development on many levels and fields in society. (Wiek, Kay 2015).

In 1992 the United Nations (UNESCO, 2014) officially declared the concept of Education for Sustainable Development (ESD) during the Conference on Environment and Development (Earth Summit) in Rio de Janeiro (UN 1992). It called for countries to use education to advance sustainable development. This subject was explored in Chapter 36 of the agenda 21 proposal.

Individuals and societies can achieve and be productive through several processes learned through formal and informal education, training, and public awareness. Environmental awareness, skills and behavior, values, and attitudes in line with sustainable development, and active public participation in decision-making are all dependent on education. The reason why education, whether formal or non-formal, is essential is because it allows people to have the capacity to evaluate and assess their concerns for their future (Daviet 2016).

Chapter 36 of Agenda 21 called on several stakeholders of society such as: governments, businesses, and civil society groups to participate in making this vision come true through several points. The chapter stated that (*Agenda 21, Chapter 36: Promoting Education, Public Awareness and Training*, n.d.):

- Literacy and basic education shall be ensured for all.
- On a global basis, environmental education related to social education shall be offered to individuals of all ages in all sectors of society.
- Closing the gap between women and men's literacy and basic education level
- Including major environmental health issues in curriculum such as drinking safe water, food, and sanitation as well as the economic effect of consuming resources

Following the Summit, UNESCO was appointed to reform education and orient the actions of all the actively involved parties in education through an extensive work program.

UNESCO identified seven objectives as follows.

- Define and communicate the idea and core messages of sustainable development education.
- Reevaluate state education regulations and reform formal education.
- Incorporate education into national action plans and strategic strategies for long-term development.
- Increase global awareness to support ecologically sustainable production and consumption habits.
- Encourage spending on education.
- Pinpoint and share innovative techniques.
- Raise public awareness.

Sustainable development is a challenging and complex subject that demands new collaborations between governments, local communities, educational and research institutions, teachers, non-governmental organizations (NGOs), and the mainstream media. Each is essential and cannot be overlooked as they work toward the creation of a sustainable culture. Education for sustainability, for example, has a direct impact on government ministries such as education, health, the environment, natural resources, planning, agriculture, and commerce. Almost all nations have reported new policies, programs, resources, and activities, indicating that education is beginning to be acknowledged as a critical component of national sustainable development strategies (Coomer, 2016).

Changing and redirecting people's attitudes to cultivate a sense of sustainable development awareness in them is necessary. Both formal and non-formal education are pathways needed to support their capacities and to unlock their ability to reflect, identify their concerns and act towards sustainable development (United Nations, 1992).

ESD was defined as the education that allows and guides citizens of the world universally to hold the responsibility of securing a sustainable future. Education, whether formal or non-formal, and public awareness should be acknowledged as a process through which people and societies can achieve their maximum potential (UNESCO 2002, 2005, 2014).

However, the lack of progress since 1992 prompted more inquiry, and an initiative for a Decade of Education for Sustainable Development was included in the Johannesburg Plan of Implementation at the Rio+10 summit. At its 57th session in December 2002, the United Nations General Assembly passed a resolution establishing the UN Decade of Education for Sustainable Development (DESD) in January 2005. Between 2005 and 2014, national governments were required to incorporate the concept of sustainability into their various educational curricula (World Summit on Sustainable Development, 2003). In the draft Implementation plan for the UN Decade, UNESCO (2005) makes clear how it views the characteristics of ESD. It sees that ESD:

1. is based on the elements of sustainability (environment, society, and the economy)
2. advocates for lifelong learning
3. is culturally relevant
4. aims to fulfill local needs keeping in mind the effects it may have internationally
5. involves all types of education (formal, non-formal, informal education)

6. keeps up with the pace of sustainable development
7. accommodates universal issues
8. Equips the community with the needed skills for decision making, reflection, and works on educating a practical skill force
9. is interdisciplinary
10. Utilizes multiple strategies to promote active learning and higher order thinking skills. (Annex II, p.6)

According to Waddock (2013), ESD is more than just formal education. ESD extends beyond formal education to provide individuals with the essential skills, knowledge, and values to overcome the hurdles that impede global sustainable development. ESD skills are meant to help people to reflect on their activities and make adjustments that benefit the environment, ultimately leading to positive action. Wals (2011) argues that education is considered as a crucial factor in the process of shifting society's values and ethics towards a more sustainable future. Additionally, “alternative forms of education and learning” are required for society to “meet the challenge of sustainability”.

In brief, ESD is meant for individuals at whatever stage they may be in their life and whatever social status they have. Its main purpose is to serve as a toolbox that equips them with the necessary skills and education to work on a more sustainable future. It works in alignment with the advancement of everyday life but at the same time locally and culturally rooted (Tilbury and Mula, 2009).

To commemorate the end of the UN Decade of ESD, a World Conference was held in Japan in 2014, where The Global Action Program (GAP) was formed to further develop and flourish ESD. The initial time of the program was to last five years (2015 - 2019). The program calls for five main key points to advance ESD:

1. Include ESD in national and international frameworks that support sustainable development and education.
2. Encourage holistic approaches to ESD across all contexts and levels, to make the shift of ESD in theory to practice easier
3. Invest in educators' and trainers' capacity to serve as learning facilitators and change agents for ESD

4. Focus on applying ESD for the youth in a civil engagement context
5. Utilize ESD to quicken local community-level efforts to find sustainable development solutions (UNESCO, 2014b).

Incorporating ESD in the lives of individuals offers them the chance to transform themselves. It gives them the opportunity to gain competences, skills, and education which all work in favor of developing the society sustainably. Furthermore, it helps them acquire global citizenship values and understand their responsibility towards not only their own culture but also the globe's. By understanding the connection between the global challenges and their present, they can work on a better future for them and the forthcoming generations (Wamsler, 2020).

ESD aims to involve all nations, developing and developed ones. It stresses on offering opportunities for the less developed countries to help wipe away poverty and inequality and intensify the efforts to transform them into a more sustainable, equitable one (Aoun et al., 2023).

ESD has earned a great importance on so many levels and is being improved and developed by the year. The most recent plan to incorporate ESD universally in individuals' lives is the ESD for 2030, a road map set by UNESCO. It is based on the outcomes and evaluation of GAP (2015 – 2019). Its objective is to reassess what constructs education and gives it value. As well as reestablish education for all levels in a way that works towards achieving sustainable development goals (SDGs) and promoting it (Kopnina, 2018).

ESD is one of the 17 Sustainable Development Goals set by the UN (SDGs). It is in SDG sub-goal 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 " (Leicht et al., 2018).

ESD serves as an intersection between all sustainable development goals and thus affects their achievements. It doesn't focus on a single field of education but rather covers all 17 SDGs. It covers climate change, social development, economic advancement, and much more. This makes for proof that ESD can play a great role in finding and solving global issues be it environment-related, political, or social by addressing them through education.

Comparatively, ESD can work parallel with global citizenship education (GCED). It can work towards active citizenship, peacekeeping, respecting human rights, and democracy. Thus, it conveys a broad range of issues the globe faces whether local or international (UNESCO, 2021).

2.4 ESD in Higher Education

Higher Education (HE) institutions have a great advantage when it comes to promoting ESD. They have the capacity to include students in working and experimenting with modern ideas and practices. Universities play a great role in fostering a mindset in students based on critical thinking, reflection, and decision-making, all of which are essential to promoting sustainable development ethics and values whether in their personal or professional lives. As Kofi Anan has previously stated:

"Our biggest challenge in this new century is to take an idea that sounds abstract—sustainable development—and turn it into reality for all the world's people" (UN, 2002)

and HE has the mandate to work towards a more sustainable society.

Focusing on students' attitudes rather than their learning outcomes is an approach that recognizes education in a way that is not just about acquiring technical skills but also about developing a holistic understanding of the world and the ability to think critically and creatively. By emphasizing values such as empathy, respect, and environmental responsibility, students can develop a deeper understanding of their impact on the world and learn how to make positive contributions to society (United Nations, 2012).

In this context, learning outcomes are not seen as the sole measure of educational success. Instead, students' attitudes, beliefs, and values are equally important. By focusing on both, educators can help students develop into well-rounded individuals who are equipped to tackle the complex challenges of the 21st century (Babalola et al., 2021).

Because ESD is a method of education that aims to encourage learners to take steps toward a more sustainable future, it includes teaching about the interdependence of economic, environmental, and social problems, as well as encouraging learners to develop the skills,

mindsets, and beliefs needed to address these issues carefully and sustainably. By understanding these principles and practices, teachers may assist their pupils become responsible and proactive citizens who can contribute to the creation of a more sustainable world.

2.5 Importance of ESD in HE

ESD is an important concept in higher education, here are some of the key reasons why it is important:

i. Develops critical thinking skills.

ESD assists students in developing critical thinking skills and becoming active, engaged citizens capable of comprehending complicated sustainability challenges and taking action to address them (Kim, 2017).

ii. Fosters environmental responsibility.

ESD stresses environmental stewardship and helps students to get an understanding of the effects of human activities on the environment. This can contribute to the development of a more sustainable and environmentally conscious society (Kitamura, 2010).

iii. Promotes social justice.

ESD also focuses on promoting social justice and equity, by encouraging students to understand and address issues related to poverty, inequality, and access to resources. This can contribute to a more just and equal society (Sund et al., 2020).

iv. Creates change-oriented leaders.

ESD can aid in the development of prospective leaders who possess the expertise, abilities, and principles required to deal with complex environmental, social, and economic concerns. These leaders can help to shape a more sustainable future (Wu et al., 2016).

Incorporating ESD into higher education can help students prepare for future issues by equipping them with the skills and information required to build a world that is more sustainable (Wiek, Kay 2015).

It can be integrated into higher education in multiple ways:

1. Curriculum development

ESD can be integrated into the curriculum by developing courses and programs that focus on sustainability issues, such as renewable energy, sustainable agriculture, or environmental policy. This can help to create a more holistic and integrated approach to sustainability education (Ferguson et al., 2022).

2. Experiential learning

ESD can be incorporated into higher education through experiential learning, such as field trips, internships, and service-learning projects. These kinds of encounters may assist students build practical skills and observe how sustainability concepts are put into practice in everyday situations (Brundiers et al., 2010).

3. Research

Through research projects and activities, ESD can also be introduced into higher education. For example, universities can prioritize sustainability research and encourage students to participate in research projects related to sustainability (Howarth et al., 2019).

4. Campus operations

Higher education institutions can also integrate ESD into their own operations by implementing sustainable practices and infrastructure, such as energy-efficient buildings, recycling programs, and sustainable transportation options. This may contribute to creating a more sustainable campus and can provide students with practical examples of sustainable practices (Lozano et al., 2013).

Role of Educators

Educators play a crucial role in promoting ESD in HE. It is important for them have a fundamental understanding of sustainable development and the pedagogy of ESD to effectively integrate these concepts into their practice.

Here are some key roles that teachers can play in integrating ESD into HE (Sund and Gericke, (2020):

Curriculum development

Teachers can develop and design curriculum that integrates sustainability concepts and practices in their subject areas. They can work together with other teachers in other disciplines to create a more comprehensive and cross-disciplinary approach to ESD.

Facilitating student engagement

Teachers can also promote active learning practices and provide chances for students to participate in sustainability-related projects, research, and community engagement efforts to increase student engagement with ESD.

Modeling sustainable practices.

Teachers can serve as role models for sustainable practices by demonstrating personal and professional commitment to sustainable behaviors and practices, such as reducing waste, conserving energy, and using eco-friendly materials and supplies.

Supporting professional development

By attending ESD training and workshops, connecting with colleagues across disciplines, and exchanging ESD resources and innovative ideas, teachers can boost their own and their colleagues' professional development.

Creating a sustainable classroom culture

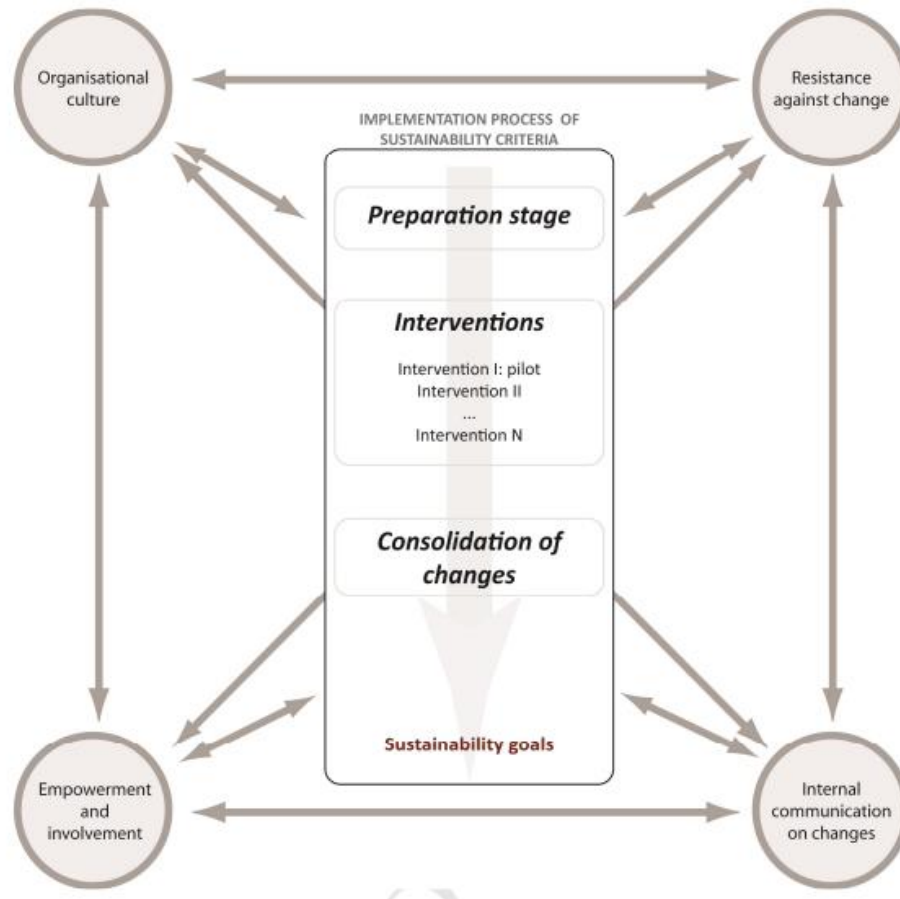
Teachers can create a sustainable classroom culture that fosters critical thinking, problem-solving, and active engagement with sustainability issues. Creating possibilities for students to ponder on the influence of their own behaviors and choices on the environment and society, as well as developing an atmosphere of debate and investigation around sustainability issues, can all contribute to this.

2.6 How can Sustainable Development be Integrated into the Curricula?

This SD's embedding procedure contains several components that must be considered for a good integration. Human factors, empowerment and involvement, and communication are examples of these components. A conceptual model will be offered below to help you understand the process better. A detailed understanding of the integration process allows for the investigation of human variables and how they influence SD integration at various phases (Verhulst, 2012).

This model (Figure 2.2) focuses on the relationships between the core construct, the SD integration process, and the human factors. The model's purpose is to provide a framework for structuring and assessing human elements during the SD integration process.

Figure 2.2 *Conceptual model of integration process of SD and four clusters of human factors*



Note. This model was produced by Verhulst. From *The role of human factors in the adoption of sustainable design criteria in business: evidence from Belgian and Dutch case studies*, by Verhulst, 2012, *International Journal of Innovation and Sustainable Development*, 6(2), 146-163.

The model has multiple purposes. To begin with, it aims to enclose a more comprehensive insight into the ways resistance into the embedding process may take place, where it may take place, and the reason behind it. Also, it allows us to observe the direct elements of resistance that cause issues and disruption in the process. Besides, it helps collect information about the tools of communication organization during the embedding process and its effect (Verhulst, 2012).

Furthermore, it serves as a tool to collect concrete information that shed light on how empowerment and involvement are organized and achieved on the ground during the implementation phase of ESD. Additionally, to obtain real data that sheds light on whether the change process has been adjusted to the current organizational culture or if the organizational culture has changed in the cases. As shown in the model, to implement change three phases are presented. It begins with an initial prepping phase, followed by multiple interventions and finally the consolidation phase (Verhulst, 2012).

However, numerous viewpoints on these phases of change have been studied; some researchers advocate for starting with direct change that begins with little acts but progresses at a steady rate (Boiral, 2008). Various perspectives on the progression of the three stages throughout a change process may be found in the literature. Several authors argue for completing the preparatory stage first and underline its importance in the transformation process (Kotter and Schlesinger, 2008).

Other researchers believe that the process is not fixed and shall be modified to the institution it is being implemented in and its culture, accordingly the specifics of the change process will be adapted (Wiesner et al., 2011).

2.6.1 Human Factors of the Embedding Process

Resistance

According to Ali (2016), the opposing forces that emerge inside an organization in response to change, such as the implementation of sustainable development in higher education, are referred to as resistance against change. When changes occur, resistance is frequently, if not always, present. It is critical that we emphasize the effects of change resistance and the need for a better understanding of these inhibitory forces. Restrictive variables are related with a change in the environment, but not with sustainability as the anticipated outcome.

When considering resistance to change toward sustainability, one aspect that comes to mind is the vagueness and murky nature of the term of sustainability, which results in an inadequate amount of unified understanding and application (Sylvestre et al., 2013).

However, other experts believe that most of the barriers that develop during the actual application of sustainability are not limited to sustainability concerns, but rather difficulties that impede an organization's ability to cope with any form of change (Barth, 2013).

Doppelt (2003) identifies the constraints discovered in his study as being globally shared, such as financial, information, recruitment, and policy concerns, which can be solved with new input and learning processes.

Most scientists who study success factors and change obstacles focus on identifying and assessing these aspects, but few consider the underlying causes, timing, or location of their occurrence (Scalabrino, 2022).

Communication

It seems difficult to determine what details should be shared, when, to what audience, and in what manner when it comes to sustainability-related topics. The knowledge and information used at the management level isn't the same as the one that should be shared with the rest of the levels. It should be translated into a more practical language that is utilized for things other than management (Sutcliffe et al., 2019).

People who are participating in the process should be considered as well. Some people may contribute to the discussion in an irrelevant way that may arise conflict or confusion in the flow of thought, which is a disruption uncalled for. When explaining the change process, a clear set of ideas needs to be established (Nejati, 2017).

The first step is to lay ground for the causes of change, next is providing the tools to be used to launch the change and a clear demonstration of the practical application that the process needs. When the theoretical part is firmly and clearly explained, the training phase shall commence. Of course, for a successful communication between all stakeholders, resistance to change should be low for a more effective development and application of the process (ChamsGarcía-Blandón, 2019).

Empowerment and involvement

When it comes to change, empowerment is empirical to the process. Individuals with a high independency, discretion and teamwork skills tend to be more meaningful in their task performance which leads to high efficiency. Also, when people are empowered and believed in,

they get the feeling that they are indispensable to the process of the change and so work hard for the success of it (Barth, 2013).

All empowerment strategies work on maximizing performance which will consequently lead to the prosperity of the project. Therefore, the more involvement of stakeholders and the higher the empowerment the greater success the process is going to yield (Sutcliffe et al., 2019).

Organisational culture

When it comes to sustainability development related projects, the obvious culture that must be adapted is a culture of sustainability. The way people behave, think, and act is what makes up the work environment in any organization. In other words, sustainability values and strategies must be practiced spreading a culture of sustainability (Nejati, 2017).

For a change to be practiced and imposed on others, those preaching it must be already practicing it. Change starts from within, both on the personal and organizational level (Sterling et al., 2015).

All of the aforementioned factors are equally important, and all serve the same purpose, the successful implementation of change. Empowerment, culture, and communication are factors that contribute to reducing resistance to change and must be all equally emphasized (Ali, 2016).

2.7 Countries that have integrated ESD.

Many countries have integrated ESD into their education systems and curriculum. Below are some examples:

2.7.1 Japan

Since the United Nations Decade of Education for Sustainable Development (2005-2014), Japan has been at the leading edge of ESD implementation. The country has integrated ESD

into its education system, including primary, secondary, and higher education (UNESCO, n.d.).

In 2005, the Japanese government passed the Basic Act on Education, which includes a provision to encourage ESD in schools. This act established ESD as a core principle of education in Japan and outlined a vision for education that prioritizes sustainability and social responsibility. The Japanese Ministry of Education, Culture, Sports, Science, and Technology (MEXT) has created a set of ESD principles that serve as a foundation for incorporating sustainability into education at all levels, from elementary schools to universities. These guidelines cover student learning goals and objectives, as well as recommendations for teaching methods and approaches (Japan Ministry of Education, Culture, Sports, Science, and Technology, 2017).

The Japanese government has established a network of ESD Model Schools and ESD Promotion Schools to promote best practices in sustainability education. These schools serve as models for other schools and provide training and resources for teachers. Many universities in Japan have developed programs and courses in sustainability and environmental studies. These programs aim to equip students with the information and skills they require to address challenging issues of sustainability and build a more sustainable society (Kitamura, 2014).

The Japanese government has also developed a range of initiatives to promote ESD, including the Eco-Schools program, which provides a framework for integrating sustainability into school operations, and the UNESCO Associated Schools Project Network (ASPnet), which promotes ESD through a network of schools around the world (Ministry of Foreign Affairs of Japan, 2019).

These schools become hubs for ESD, implementing projects, collaborating with others, and sharing best practices. Japan boasts the most ASPnet members globally, providing numerous examples of ESD in action. Meioh High School for example, have undertaken projects like environmental education programs, tree-planting initiatives, and even collaborations with schools in other countries to exchange knowledge and best practices on sustainability issues (MEXT, n.d.).

2.7.2 Germany

Germany has integrated ESD into its education system since the 1990s. ESD has been incorporated into various disciplines and courses, including science, social studies, and languages (Grunwald, 2011).

In 2009, the German government adopted a National Action Plan on Education for Sustainable Development, which established a framework for integrating sustainability into education at all levels. The German education system places a strong emphasis on interdisciplinary learning and problem-based approaches, which provide opportunities for integrating ESD across subject areas (Mogensen and Schnack, 2010).

Many German universities offer degree programs and courses focused on sustainability, including environmental sciences, sustainable engineering, and sustainable economics. The German government has established several national initiatives to promote ESD, including the German Network for Environmental Education and the National Platform for ESD, which provide resources and support for educators and students (Didszun and Bormann, 2016).

German schools have incorporated a variety of sustainable practices, including energy-efficient buildings, trash reduction programs, and green schoolyards, to present pupils with real-world models of sustainable living (Grunwald 2011).

2.7.3 Sweden

Sweden has a long history of incorporating sustainability into its educational system. ESD is integrated into primary, secondary, and higher education. Several sustainability-related programs are available in Swedish universities (Lundholm, 2013).

The Swedish National Agency for Education has created a set of standards for incorporating sustainable development into all levels of education, including higher education (Swedish National Agency for Education, 2013). The Swedish Environmental Protection Agency has also issued guidelines for incorporating environmental and sustainability topics into higher education (Swedish Environmental Protection Agency, 2016).

Lozano and Lukman (2011) conducted a study on sustainability in Swedish higher education institutions and discovered that, while many universities have sustainability plans and policies in place, there is still room for more integration of sustainability into the curriculum and teaching practices.

Lozano and colleagues (2017) did another study on the integration of sustainability into higher education in several European countries, including Sweden. The study discovered that sustainability is regularly incorporated into higher education through diverse courses and programs, but that more collaboration and integration across fields and institutions is required.

2.7.4 South Africa

South Africa uses ESD in its education system to promote social and environmental sustainability. ESD is integrated throughout primary, intermediate, and higher education in South Africa (Republic of South Africa, 2002). In 2013, the South African government issued a White Paper on Post-School Education and Training, which included a commitment to incorporate ESD into the curricula of all post-school education and training institutions (Department of Higher Education and Training).

South African universities are implementing ESD in a variety of ways, according to Walshe and Alhaddad (2018), including the development of sustainability-focused degree programs, the incorporation of sustainability content into existing courses, and the integration of sustainability into campus operations and governance.

The South African Higher Education Quality Committee (HEQC) has produced criteria and benchmarks for the integration of ESD into higher education institutions, with a focus on creating graduate sustainability traits (Van Wyk, 2015). ESD has been implemented into the curricula of numerous fields in South African higher education, including business, engineering, and health sciences, according to Lotz-Sisitka et al. (2016).

2.7.5 Brazil

Brazil has a national policy on ESD that focuses on promoting sustainable development through education. ESD is integrated into various disciplines, including science, mathematics, and social studies (UNESCO, n.d.).

Gouvea and Ferreira (2018) investigate the incorporation of ESD into the curriculum of a Brazilian business school and discover that it has been helpful in increasing students' understanding of sustainability issues as well as enhancing their critical thinking and problem-solving skills.

De Almeida et al. (2021) present a case study of ESD integration in a Brazilian engineering program in which they employed problem-based learning and cross-disciplinary techniques to engage students in sustainability challenges. They discover that this technique can be beneficial in increasing students' grasp of complicated sustainability issues and strengthening their ability to work together.

However, De Oliveira et al. (2018) discuss the challenges of implementing ESD in Brazilian universities and suggest that it requires a systemic approach that involves changes in curriculum, teaching methods, and institutional culture. They also argue that there is a need for more research on the effectiveness of ESD initiatives in the Brazilian context.

2.7.6 Canada

Canada has integrated ESD into its education system, including primary, secondary, and higher education. ESD is incorporated into various courses, including science, social studies, and languages. It has a long-standing commitment to promoting ESD in its curriculum, with initiatives dating back several decades. The Canadian Council of Ministers of Education developed the Pan-Canadian Framework for ESD in 2013, which provides a comprehensive approach to integrating ESD into all levels of education across Canada. The framework includes a set of guiding principles and a range of resources and tools for educators to use in the classroom (Canadian Council of Ministers of Education, 2013).

Each province and territory in Canada have developed its own set of ESD standards and guidelines for educators, which are aligned with the Pan-Canadian Framework. These standards provide a clear set of learning outcomes and objectives for students, as well as resources and materials for teachers to use in the classroom (Ontario Ministry of Education, 2016).

In many Canadian universities, ESD is integrated into various academic programs and courses, including environmental studies, sustainability, and social justice. These programs seek to offer students with the knowledge and skills required to address difficult sustainability concerns while also promoting a more equitable and sustainable society (Brock University, n.d.).

Many Canadian universities offer degree programs and courses in sustainability, including environmental studies, sustainable business, and sustainable engineering. These programs seek to provide students with the knowledge, skills, and values necessary to address sustainability concerns. Universities in Canada have implemented a number of sustainability initiatives, including green buildings, waste reduction programs, and campus gardens, to provide students with real-world examples of sustainable living (Fissi et al., 2021).

Several Canadian organizations, such as the Association for the Advancement of Sustainability in Higher Education (AASHE) and the Canadian Alliance of Sustainable Energy (CASE), provide resources and support for universities and colleges to advance sustainability on their campuses (Canadian Alliance of Sustainable Energy, n.d.).

2.7.7 United Kingdom

The United Kingdom has integrated ESD into its education system since the 1990s. ESD is incorporated into various disciplines, including science, social studies, and geography (Sterling, 2004).

The UK government developed the Sustainable Schools Framework in 2006, which provided a framework for integrating sustainability into the curriculum and school operations. The framework included a range of resources and tools, such as lesson plans and case studies, to support teachers in incorporating sustainability principles into their teaching (Department for Children, Schools, and Families, 2006).

In 2008, the UK launched the Sustainable Development Commission's report, "Prosperity without Growth," which highlighted the need for a new approach to economic development that emphasized sustainability. According to the report, sustainable development principles should be integrated into all parts of society, including education (Sustainable Development Commission, 2008).

Following the publishing of this study, the UK government established the Department for Environment, Food, and Rural Affairs (DEFRA) in 2010 to develop a national strategy for ESD in schools. The resulting strategy, "Learning for Sustainable Development: Implementation Plan 2011-2016," provided a framework for embedding sustainable development concepts into all aspects of the curriculum (Department for Environment, Food, and Rural Affairs, 2011).

The implementation plan comprised several activities, including the creation of a sustainability toolkit for schools, the incorporation of sustainability principles into teacher education, and the creation of a variety of tools and materials to assist ESD in the classroom (Defra, 2012).

The UK has taken a comprehensive approach to integrating ESD into the curriculum, with both national and local efforts. The inclusion of sustainability principles into education has been a constant process, and more effort has to be done to ensure that all students have the opportunity to learn about and engage with concepts of sustainable development.

These are just a few countries that have incorporated ESD into their curricula. Many other nations have also included ESD into their educational systems, demonstrating the global acknowledgment of the necessity of sustainable development and the role of education in attaining it.

The following table serves as a summary for the above mentioned countries' implementation of ESD.

Table 1.1: ESD Implementation in Selected Countries

Country	Key Initiatives	Focus	Examples
Japan	Basic Act on Education (2005): Encourages ESD in schools - MEXT ESD principles: Guide for incorporating sustainability into all education levels - ESD Model Schools & Promotion Schools: Promote best practices - University programs in sustainability & environmental	Whole-system approach: ESD in curriculum, schools operations, and teacher training	Meioh High School: Environmental education, tree planting, international collaboration

	studies - Eco-Schools program: Integrates sustainability into school operations - UNESCO ASPnet: Network of schools promoting ESD		
Germany	National Action Plan on ESD (2009): Framework for integrating sustainability into education - Emphasis on interdisciplinary learning and problem-based approaches - University programs in sustainability-focused fields (environmental science, engineering, economics) - German Network for Environmental Education & National Platform for ESD: Resources and support for educators - Sustainable practices in schools (buildings, waste reduction, green schoolyards)	Interdisciplinary integration: ESD across various subjects and practical application	Sustainability-related programs in various disciplines offered by universities
Sweden	National standards for incorporating sustainable development into all education levels - Swedish Environmental Protection Agency guidelines for incorporating sustainability into higher education - Many universities have sustainability plans and policies	Curriculum and policy focus: Integrating sustainability into curriculum and teaching practices	Need for more integration across fields and institutions as identified in research
South Africa	White Paper on Post-School Education and Training (2013): Commitment to ESD in all institutions - HEQC criteria and benchmarks for integrating ESD - ESD implemented in various ways: dedicated programs, course integration, campus operations	Multi-pronged approach: Specific focus on graduate sustainability traits	Sustainability-focused programs in various fields (business, engineering, health sciences)
Brazil	National policy on ESD promoting sustainable development through education - Integration of ESD across various disciplines (science, math, social studies)	- Business schools incorporating ESD for critical thinking and problem-solving on sustainability - Engineering programs using problem-based learning and cross-disciplinary approaches for sustainability challenges	Systemic approach needed (curriculum, teaching methods, culture), research needed on effectiveness
Canada	Pan-Canadian Framework for ESD (2013): Comprehensive approach for all education levels - Provincial/territorial ESD standards and guidelines aligned with the Pan-Canadian Framework - University programs in environmental studies, sustainability, and social justice	National framework with regional implementation: Clear learning outcomes and resources for educators - Sustainability-focused programs	Support from organizations like AASHE and CASE for advancing campus sustainability

		in various disciplines (environmental studies, business, engineering) - Universities implementing green initiatives (buildings, waste reduction, gardens)	
United Kingdom	Sustainable Schools Framework (2006): Resources and tools for integrating sustainability - "Prosperity without Growth" report (2008): Need for new sustainable economic development approach - "Learning for Sustainable Development: Implementation Plan 2011-2016": Embedding sustainability into curriculum	National strategy with local efforts: Continuous process of integrating sustainability principles - Sustainability toolkit for schools, teacher education focus on sustainability	Ongoing need to ensure all students have opportunities to learn and engage with sustainability concepts

2.8 Educators' Competencies for ESD

Educators' competencies for ESD include a wide range of skills, knowledge, and attitudes that are necessary for promoting sustainability in the classroom and beyond. Some of these competencies are as follows:

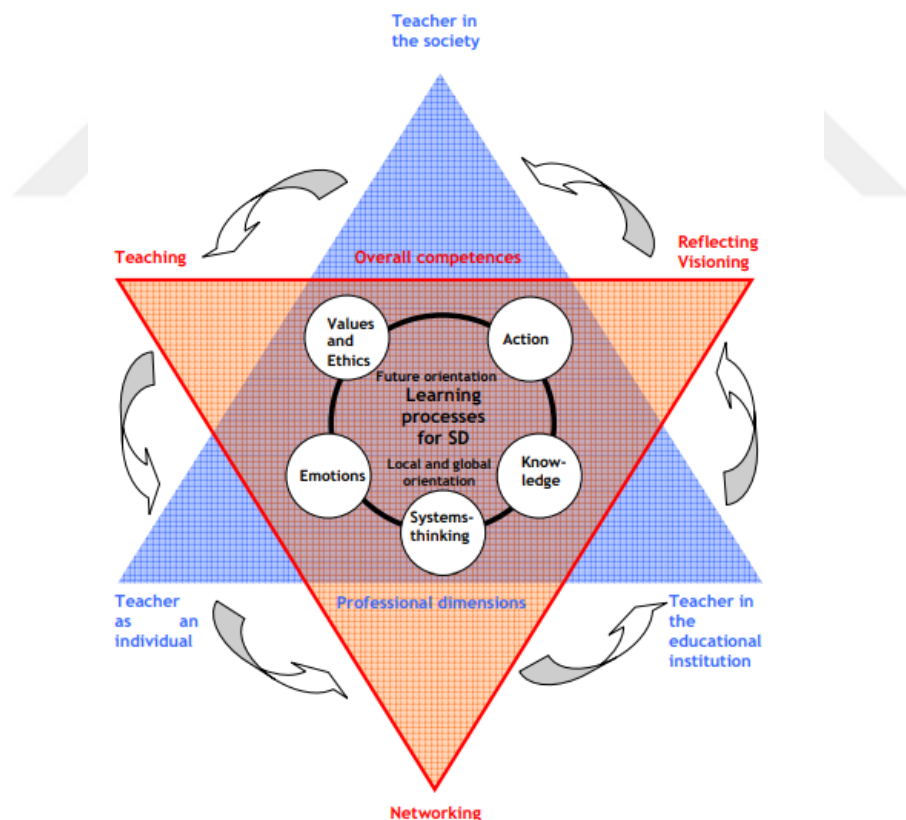
1. Educators need to have a broad and interdisciplinary understanding of sustainability concepts and practices, including ecological, social, and economic dimensions of sustainability.
2. Educators must also have pedagogical abilities that allow them to effectively integrate ESD into the curriculum, such as crafting lesson plans and educational resources that are tailored to students' needs and interests.
3. Educators must be capable of developing students' critical thinking abilities by asking open-ended questions, encouraging discourse and discussion, and motivating students to think critically on their personal views and presumptions about sustainability.
4. Educators need to have collaborative skills that enable them to work with colleagues across disciplines to develop integrated and interdisciplinary approaches to ESD.
5. Educators must have strong communication skills, particularly the capacity to convey complicated sustainability concepts to pupils, peers, and other stakeholders.

6. Educators must be action-oriented to motivate and empower students to take action on environmental concerns, such as establishing service learning and community involvement opportunities that allow students to apply sustainability principles and practices in real-world contexts.

7. To improve their own ESD competencies, educators must engage in self-reflection and continuous learning, which includes staying current with the latest advances in concepts of sustainability and behaviors, getting into opportunities for professional growth, and reflecting on their own methods of instruction and student learning outcomes (Scherak and Rieckmann, 2020).

There have been multiple frameworks about ESD educators' competencies. Among these is the CSCT model (Curriculum, Sustainable development, Competences, Teacher training, 2003), UNECE model and the COMBINE model.

Figure 2.2: CSCT Framework



Note. This figure displays the three types of models of teacher competencies framework.

From: “Teachers’ Competencies for the Implementation of Educational Offers in the Field of Education for Sustainable Development”, by Bertschy, 2013, *Sustainability*, 5(12), 5067–5080. <https://doi.org/10.3390/su5125067>.

As shown in the figure there are two inverted triangles, red for overall competencies in ESD and blue for professional dimension. The approach considers a teacher's entire personality, rather than just his or her professional self, when it comes to sustainable development (Defra, 2012). A teacher's position should be considered as more than just that of an instructor, but as someone who is actively involved in a dynamic relationship with their students, coworkers, and society (Scherak and Rieckmann, 2020).

This relationship is important for creating an environment that fosters genuine learning in education for sustainable development. Teachers are not just transmitters of knowledge, but also members of an institution that has a collective focus on how all members learn and develop. To fulfill this role effectively, teachers need specific competencies and overall competencies. The three competencies are teaching, reflecting, visioning, and networking (Rychen and Salganik, 2003).

ESD should shift its focus to a more constructive approach in teaching, recognizing that acquiring skills and knowledge is an active process that can be supported through constructivism. It is important for educators to consider new perspectives and envision transformative change. Hence, visioning and reflecting help address real-world problems and create learning opportunities in transforming society. It is vital to engage in a process of thought, visioning, planning, and action, as well as to develop relationships and networks both within and outside of institutions. Networking will create a learning environment that follows a continuous cycle of growth and improvement. The five domains of competencies in teaching and learning for ESD have to be applied to each of the professional dimensions relate to all overall competences (Scherak and Rieckmann, 2020).

2.9 Implications of ESD in Higher Education

Implementing ESD in higher education can have several implications, including:

1. Enhanced understanding of sustainable development: ESD can help students acquire a more in-depth understanding of the complex issues surrounding sustainable development. By integrating sustainability into various disciplines and courses, students can learn how to address societal, economic, and environmental challenges more effectively (McKenzie, 2019).

2. Critical thinking skills development: 2. ESD encourages critical thinking, problem-solving, and decision-making. Students can develop these fundamental abilities, which are useful in a variety of professional and personal contexts, by participating in debates and projects that address sustainability issues (Rickinson, 2001).
3. Increased awareness of environmental and social issues: 2. ESD promotes awareness of the environmental and social consequences of human actions. Students can learn about the environmental, economic, and social consequences of unsustainable practices, as well as ways to help (Linnenluecke and Griffiths, 2010).
4. Improved employability: Graduates with knowledge and abilities in sustainability gained through ESD may have a competitive advantage in the labor market. Employers are increasingly looking for individuals who are aware of sustainability issues and can apply sustainable practices in their work (Jones, Hillier, and Comfort, 2016).
5. Higher education institutions may significantly profit society and the environment by incorporating sustainability into their teaching, research, and community involvement initiatives. Institutions can lead by example by implementing sustainable practices on their campuses, contributing to sustainable development research and innovation, and engaging with communities to address sustainability challenges (Barth, Godemann, and Rieckmann, 2007).

CHAPTER 3

METHODOLOGY

This master's thesis embarks on an exploratory journey into the realm of ESD within higher education institutions, advocating for an insightful methodology that harnesses the potency of secondary data. Given the vastness of digital content generated over this period, primary data collection presents significant challenges in terms of scope, resources, and feasibility. Consequently, the utilization of secondary data is an astute methodological decision to efficiently access and analyze a broad spectrum of relevant information.

This chapter will re-examine current information sets, summaries and compile them to improve the overall effectiveness of the research, allowing us to obtain insights and develop new findings. Previously collected data provides a valuable source of information and helps us gain a more thorough set of conclusions, in this paper the methodology will follow a secondary analysis of data from case studies method.

This methodology, rooted in the utilization of secondary data, not only streamlines the research process but also offers a unique perspective on the challenges and opportunities in achieving sustainable development through education.

The choice to employ secondary data as the principal methodological approach is a strategic one, motivated by several paramount factors. Firstly, the study's scope spans across an array of higher education institutions, both geographically and institutionally diverse. This necessitates access to a wide array of documents, reports, and publications, which could be impractical to collect through primary data collection methods. Secondary data serves as a potent vehicle to access this extensive knowledge reservoir efficiently.

By tapping into secondary data sources, we not only bypass time-consuming primary data collection efforts but also gain access to historical records that document the evolution of ESD in higher education institutions, tracking its trajectory from its inception to its present state. By relying on publicly available data sources, we mitigate potential ethical pitfalls, ensuring the integrity and transparency of our research.

By exploring the intricate web of data through this methodology, we aim to contribute to the academic discourse on ESD within higher education. The utilization of secondary data un-

derpins a comprehensive review of the existing literature, providing a foundational understanding of the ESD landscape. Moreover, it enables us to examine this multifaceted issue from various angles, synthesizing diverse perspectives and generating innovative insights.

The first step of conducting secondary data analysis was to identify the research questions. This allows us to narrow our search down to what can answer our questions. This paper selected research that mainly focused on case studies. After that, a thorough investigation was done to select target countries to study. After narrowing down the type of research and its location, data was analyzed and sorted. The collected database was filtered into what answers the research questions mentioned earlier and any irrelevant case studies were disregarded. The next step was to select countries to be considered in this paper as our case studies.

An effective research technique for going in-depth on a particular topic, such as a person, group, occasion, or phenomena, is the case study method. Case studies, as opposed to general surveys, seek to comprehend the nuances of the topic within its actual setting. Using this approach, researchers immerse themselves in the details, compiling data from multiple sources to produce a complete picture.

Contextual analysis is one of the case study method's defining characteristics. It is not only about the topic at hand; it is also about the context in which it operates. This could have to do with societal factors, historical context, or the immediate surroundings. Researchers can have a deeper comprehension of the subject's behavior or circumstances by knowing these elements.

Numerous disciplines, including psychology, business, health, and education, use the case study method. It's especially helpful for investigating unusual or complicated circumstances when conducting regular trials might not be feasible. Through a comprehensive analysis of a solitary case, scholars can extract significant knowledge that can be implemented in more expansive settings, guiding subsequent determinations or comprehending analogous circumstances.

It's crucial to recognize case studies' limits, though. It can be difficult to extrapolate the results to a larger population because they concentrate on a single incident. Furthermore, the way the researcher gathers and interprets the data may have an impact on the results' objectivity.

Italy and Spain, both in Southern Europe, have well-established education systems that place a heavy focus on higher education, with famous universities and a commitment to academic achievement. These European Union nations are considered first-world countries, with advanced economic and social development. The school system in Italy is profoundly established in history and tradition, creating a rich cultural and intellectual atmosphere. Similarly, education is highly valued in Spain, which has a network of universities noted for their contributions to science, the arts, and humanities (Tejedor et al., 2020).

Qatar has made significant educational gains in the Middle East, leveraging its economic wealth to engage in international collaborations and modernization. Qatar, as a first-world country, has developed Education City, which houses top-tier international universities, demonstrating the country's dedication to creating a knowledge-based economy (Phan, 2022). Meanwhile, both Japan and Sweden, which are in Asia but have distinct cultural and societal aspects, are known for their high-quality education systems (Sutherland and Jackson, 2022). Japan, a first-world country and global leader in technology and research, places priority on STEM education, whereas Sweden, another first-world country, places a premium on diversity and a learner-centered environment (Freeman et al., 2019).

Malaysia, located in Southeast Asia, has achieved noteworthy success in expanding educational access by focusing on boosting enrollment rates and improving educational facilities. Malaysia, as a developing country on its way to become a first-world country, exhibits a dedication to educational growth (Khan et al., 2022). In North America, the United States retains a varied education environment defined by outstanding colleges and a commitment to academic freedom. As a first-world country, the United States' education system continues to be a global leader in higher education (Ma, 2020).

Nigeria, on the other hand, presents educational obstacles, although continuous efforts attempt to improve accessibility and quality, seeing education as a crucial driver of socio-economic growth. Nigeria is considered as a developing country that is attempting to improve its education system (Zarei and Mohammadi, 2022). With a broad and diverse education system, India in South Asia has been working on improving access and outcomes, making reforms to alleviate inequities and improve overall quality. India, as a developing country, is aggressively attempting to achieve first-world status (Varughese and Bairagya, 2020). Lebanon, located in the Middle East, suffers educational issues because of sociopolitical instability. Lebanon, classified as a developing country, has a long history of commitment

to learning and knowledge, with a resilient education system that strives to overcome adversity (Arar, 2020).

This study is not only an academic attempt, but also a passionate investigation of the role of higher education in accelerating sustainable development. As we embark on this journey, we welcome readers to delve into the nuances and complexities of secondary data research, which promises to shed light on the way to academic enlightenment, a more sustainable future, and a thorough understanding of education's role in molding it. In the following pages, we will explore the digital reservoir of knowledge, uncovering the narratives and techniques that have the potential to shape a more sustainable future through higher education.



CHAPTER 4

FINDINGS

In the preceding chapters, we examined the theoretical underpinnings, and defined our research methodology laying a solid foundation for our investigation. This chapter represents the culminating point of our research, where the empirical insights, patterns, and implications discovered during our study, offer a comprehensive portrayal of our findings.

The pursuit of sustainable development in higher education has been a passion, an intellectual endeavor, and a desire for positive change. The importance of ESD in higher education cannot be emphasized, as it connects with educational institutions' transformative power to train future generations for a sustainable world. This chapter is the culmination of our scholarly endeavor, presenting the realities, problems, and opportunities that drive ESD in higher education today.

This research focused on the unique characteristics of ESD in the context of higher education, examining the role of institutions, policies, curricula, and practices in fostering a sustainability-conscious generation. We probed, questioned, and explored to uncover the multi-dimensional aspects of ESD implementation, adaptation, and impact. The following findings showcase the extent to which institutions have embraced ESD in several countries.

4.1 Italy

The case study that follows comes from the University of Florence in Italy. According to research done by Carli et al. (2020), an emphasis on green buildings, renewable energy, waste reduction, sustainable transportation, and community engagement are among the sustainability initiatives put in place by the University of Florence in Italy. It offers information on how a sizable institution, like a university, might change to become a sustainable one. A qualitative case study of the sustainability practices and initiatives adopted by the University has been performed.

Utilizing eco-friendly materials, such as recycled-content insulation and low-emission paints, as well as energy-saving lighting and heating systems are all part of the university's sustainable building practices. The University also uses rainwater harvesting systems to

gather rainwater for irrigation and toilet flushing, as well as green roofs to assist the reduction of storm water runoff and enhance air quality (Carli et al., 2020).

The University offers bike parking areas and bike sharing services, promotes the use of public transit, and provides rewards for carpooling to advance sustainable transportation. The University's waste reduction efforts include composting food waste to create fertilizer for campus gardens, recycling programs for paper, plastic, glass, and metal, and lowering paper use through digitalization. As part of its sustainable food program, the University also sources regional and organic food and encourages vegetarian and vegan options in its cafeterias and restaurants (Carli et al., 2020).

To lessen its dependency on fossil fuels, the University has developed renewable energy initiatives such as solar panels, which supply 5% of the University's electricity, and geothermal heating and cooling systems, which provide heating and cooling for various campus buildings. The University has also integrated sustainability into its academic programs, offering courses and workshops on sustainable practices and environmental issues, as well as promoting sustainability research through its research centers and collaborations with other universities and organizations (Carli et al., 2020).

Finally, the university works with neighborhood groups to promote urban gardening and biodiversity preservation in the city and involves the community on sustainability problems (Carli et al., 2020). To spread awareness and inspire others to embrace sustainable practices, the University also informs the public about its sustainability projects and accomplishments through events, social media, and its website (Carli et al., 2020).

Sustainability activities at the University of Florence have been successful in lowering the university's environmental impact and promoting sustainable behaviors among staff, students, and the community. The University's complete and integrated approach to sustainability has been a crucial component in its success, including sustainability into all aspects of university operations and activities (Carli et al., 2020).

However, some difficulties encountered by the University in implementing sustainable practices were identified:

To begin, the authors note some resistance to change among faculty and students, especially when it comes to introducing new sustainable practices. To combat this, education and awareness-raising initiatives such as workshops and training sessions were adopted.

Furthermore, implementing sustainable practices typically involves a significant financial investment, which can be challenging for organizations with little resources. The University of Florence overcame this obstacle by emphasizing sustainable methods and sought outside financing and partnerships. There were also regulatory impediments that made some sustainable initiatives, such as renewable energy projects, difficult to adopt. To address these obstacles, the University of Florence collaborated with local authorities and lawmakers.

Finally, disagreements among stakeholders might make it difficult to implement sustainable practices that are acceptable to all. The University of Florence solved this difficulty by involving stakeholders and incorporated their viewpoints into the formulation of sustainability projects. Despite these obstacles, the authors remark that the University of Florence was able to successfully integrate sustainable practices and promote sustainability among its faculty, students, and community members. The case study emphasizes the importance of addressing these challenges through stakeholder involvement, teamwork, and a holistic approach to sustainability.

4.2: Spain

The case study is based on a STEM (science, technology, engineering, and mathematics) course called "Sustainable Development and Innovation" that student teachers take at the University of Extremadura in Spain. The course aims to provide students with the necessary abilities to employ ESD in their future classrooms. The primary skill focused on was the use of Service Learning (SL) as an ESD teaching technique. Throughout the course, students worked on a real-world project to identify and plan a sustainable solution to a local environmental challenge.

The study included 46 pre-service teachers who took part in a two-month SL project meant to give sustainable principles linked to resource and environmental preservation, as well as training and teaching methodologies for implementing these concepts with pupils. Through this method, students experienced ESD personally before implementing it in their own classroom.

The course's goal is to link students with their surroundings, notably the city of Cáceres, to work towards the preservation of its historical values and environmental conservation. The

city of Cáceres is a UNESCO World Heritage Site, and the service-learning initiative aims to help young people maintain and enjoy the city more sustainably.

Before working on a plan, students' knowledge of the SDGs was assessed and supplemented with extra information to ensure a comprehensive comprehension of SD. They were then exposed to the concept of SL as an ESD tool and given the opportunity to use it. The students then toured their city's old areas and learnt more about its legacy and value before deciding on an issue to address in groups. Following that, each group would present their concept, including factors such as cost and logistics, and a discussion would ensue.

The students' sustainability projects included initiatives such as organizing a community recycling program, creating a community garden, and designing an educational program on sustainable living for local inhabitants. Throughout the project, the students collaborated extensively with community partners such as local government agencies and non-profit groups.

Students were required to provide a written report and a presentation on their project at the conclusion of the project, which were examined by the course professors. Among the evaluation criteria were the project's influence on the area, the students' comprehension of sustainability ideas, and their ability to work successfully in groups. According to the study's findings, the service-learning initiative improved students' comprehension of sustainability ideas as well as their capacity to apply these principles in real-world settings. The students showed high levels of satisfaction with their own efforts, as well as a sense of personal improvement and development because of their involvement.

According to the study's findings, service learning can be a useful teaching strategy for improving sustainability education in STEM courses. To encourage sustainability projects, the authors emphasize the need to provide students with hands-on, practical educational opportunities and cooperating closely with community partners.

Furthermore, the study revealed several challenges in implementing the service-learning technique for ESD in a STEM course. Implementing the service-learning strategy was made difficult by time restrictions as well as limited resources such as funds and staffing. Service-learning activities require meticulous planning and coordination, which can be difficult with limited time and resources.

Martin-Sánchez (2020) claims it was difficult to bridge the gap between STEM and social sciences. While the service-learning component requires a deeper grasp of sustainability as

a social and environmental concern, the STEM course concentrated on technical aspects of sustainability. In addition, controlling student expectations was difficult. Some students may have been more interested in the technical aspects of sustainability covered in the STEM course than in the social and environmental dimensions stressed in the service-learning component, and students may have had preconceived notions about what the service-learning component would entail.

It was also difficult to ensure meaningful community engagement. The service-learning module required thorough collaboration with community-based organizations, and it was vital to guarantee that the programs were relevant to the community's needs and interests. While service learning can be an effective technique for ESD in STEM courses, it requires careful planning and coordination to overcome these obstacles (Martin-Sánchez et al., 2020).

4.3: Qatar

The mission of Qatar's Ministry of Education and Higher Education (MOEHE) is to regulate and support high-quality learning opportunities at all educational levels in order to provide individuals in Qatar's society with the necessary knowledge, skills, and attitudes based on their abilities and in accordance with national values. MOEHE's strong emphasis on twenty-first-century skills, values, and attitudes, as well as the need to stay current with worldwide trends in teaching and learning, is consistent with the global debate on the necessity and importance of ESD (Al-Nuaimi et al., 2022).

As part of its national vision, Qatar seeks to create a cutting-edge, top-tier educational system that will provide its inhabitants with the skills and knowledge they need to deal with the world's shifting complex dynamics. At the same time, it seeks to promote analytical and critical thinking, a strong feeling of citizenship and belonging, creativity and innovation, and respect for Qatari society's values and legacy (Qatar General Secretariat for Development Planning, 2008).

The following study was undertaken to assess HE students' understanding of sustainable development and to determine the most effective technique for perceiving sustainability. During the spring semester of 2022, 212 university students from various fields and universities received a questionnaire assessing their knowledge, attitude, and conduct toward sustainable development.

The findings demonstrated that, while students had a strong understanding of sustainability, their attitudes and behaviors toward sustainable development were not. As a result, more than 80% said they knew enough about sustainability. 64% of respondents indicated that higher education students have a positive attitude toward sustainability. The students' replies show that they engage in positive sustainability behaviors around 47% of the time, as evidenced by the percentage of positive responses.

According to the responses gathered, traditional educational settings are not the only factor in sustainability awareness; rather, social media, news, and family and friends are the most responsible for providing HEI students in Qatar with knowledge, attitudes, and practices.

Examining the origins of the sustainability outcomes revealed that these other elements are mostly responsible for the students' relatively high degree of awareness. The curriculum comes next, then the community, and lastly the campus. Based on the remarks, it's possible to conclude that "other sources" are more effective than the curriculum, community, and campus combined efforts.

Social media, for example, in an era of internet access and digital information, has a major impact on societies and the overall state of mind of the worldwide population. Understanding the formation and impact of such elements can serve as the foundation for incorporating them into educational system characteristics such as curriculum, community, and campus to maximize ESD's effectiveness in reaching the SDGs. Based on the questionnaire distributed to the participants, they believe that higher education institutions in Qatar should concentrate on enhancing their students' attitudes and behaviors toward sustainable development.

These findings shed light on the current condition of sustainability awareness and recommend some practices among Qatari higher education students. Higher education institutions in Qatar may collaborate in an array of strategies to increase students' sustainability understanding and behaviors. These recommendations involve implementing sustainability into higher education courses in Qatar to expose students to sustainability concepts and practices.

Creating a sustainable campus environment that fosters sustainable practices among students, such as lowering energy use, minimizing waste, and conserving water. Furthermore, encouraging faculty members to include sustainability into their teaching and research activities might be beneficial. Providing students with training and workshops on sustainable development and related themes, as well as forming collaborations with local communities

and organizations to promote sustainability knowledge and practices among students, is critical in creating sustainability consciousness.

The proposals seek to increase higher education students' understanding of sustainable development throughout the three learning outcome domains of knowledge, attitude, and practice.

Understanding sustainable growth in higher education through knowledge, attitude, and practice in the curriculum, community, and campus can help students choose the best path to achieve sustainability. The enhanced awareness of sustainability in education enables the maximizing of ESD efforts to address sustainable development within education, giving future generations a greater chance of tackling future sustainability concerns and attaining sustainable development.

In this regard, establishing and expanding quality education is vital to ensure that Qatar's education system satisfies the demands of current and future labor markets (Qatar General Secretariat for Development Planning, 2011, 139). Another significant feature is the emphasis on teaching students with a solid foundation in Qatari religious, moral, and ethical values, as well as national identity, customs, and cultural heritage.

4.4: Japan

Numerous ESD-related curriculum and programs have been developed by Japanese higher education institutions. People of academia stated that they intend to help the international community address global environmental issues such as climate change and other global-scale issues affecting humanity's survival.

The promotion of ESD in Japan's higher education is becoming increasingly active, thanks in part to government policy backing (Yonezawa et al., 2014). The case study takes an observational approach to initiatives in Okayama and Tokyo, two of Japan's most advanced ESD sites. The activities and behaviors of university students and instructors were observed and documented, and semi-structured questionnaire interviews were conducted.

The case study assessed the capabilities and possibilities of UNESCO's proposed ESD framework for raising environmental awareness and changing citizens' environmentally conscious behavior in local communities. The study used qualitative approaches to capture and measure these groups' level of consciousness regarding ESD activities, with data collected from 46 individuals from two regions (Okayama and Tokyo). It evaluated and analyzed textual data collected from these three groups, presenting options for community learning efforts targeted at raising environmental awareness and modifying behavior.

Two attempts have been undertaken, one in Okayama and one in Tokyo. The first attempt, situated in Okayama City's northern outskirts which is a mountainous area, entails learning about the necessity of living together between both humans and the environment, as well as developing proposals for action to be carried on to future generations. Citizens and stakeholders in Okayama devised the "Okayama Model" in 2011 to foster ESD through a collaborative approach engaging local organizations to tackle community challenges. The framework includes five tenets, or "Okayama Indicators," emphasizing the necessity of conversation, stable management, a full-time ESD coordination, community centers as ESD promotion hubs, and universities taking the lead in ESD in the region.

Participants made use of community halls as ESD facilities for residents of Okayama and held events and workshops that target environmental awareness. The participants described this as a "Public Living Room" for the people of the city where they all share and discuss their concerns regarding environmental SD issues. Through this model both participants and citizens tackle SD issues and worked on finding the proper solutions.

This suggests that the public living room model contributes to behavioral change. The notion emphasizes the crucial nature of loose connections, active conversations, and areas for such conversations for the purpose to boost ESD programs expansion. It proposes that community facilities and other social educational spaces should be promoted as local resources to be employed in advocating ESD and improving participant learning results.

The second attempt, supervised by university students in the heart of Tokyo, was in The Waseda University Center for Global Education (CGE). They actively champion sustainability efforts not only on campus but also within the surrounding district. This commitment fosters a culture of environmental awareness and responsibility. CGE spearheads tree-planting initiatives, likely organizing or participating in projects that green the campus and the

district. These initiatives not only beautify the environment but also contribute to cleaner air and a more biodiverse ecosystem.

Educating the next generation is a cornerstone of CGE's mission. They hold environmental education workshops specifically designed for elementary school children in Bunkyo. These workshops equip young minds with the knowledge and skills they need to become responsible stewards of the environment. Topics likely covered include the importance of sustainability and environmental protection, understanding local environmental challenges, and practical skills for sustainable living, such as waste reduction and recycling.

According to the study, including university students in community ESD activities have the potential to benefit the community by promoting environmental awareness and attitude change, health care, and the importance of living in harmony with nature. Furthermore, the involvement of organizations and groups with diverse backgrounds and fields of specialization is critical in the development of human resources capable of tackling local concerns from an ESD standpoint.

Social education institutions can serve as amplifiers for enhanced educational results for people taking part while also serving as the foundation for sustainable behavior adjustments and healthy citizenry. Encouraging cooperative and interactive learning activities featuring different individuals to boost environmental awareness and foster changes in behavior by means of social education establishments grounded in local communities may elevate the incentive to learn and increase the influence of ESD on local communities and citizens.

However, the study also calls that future research difficulties and opportunities, such as having to gather additional qualitative information from numerous ESD action situations and the requirement for a survey to obtain quantitative data from stakeholders may help confirm the study's conclusions (Oe et al., 2022).

4.5: Sweden

Since 2006, higher education institutions in Sweden should, according to the Higher Education Act, promote sustainable development. ESD is incorporated into governing documents at all levels of the Swedish education system, the curriculum of all levels from per-school to higher education.

Chalmers University of Technology utilized an approach to attain a higher degree of ESD integration by forming a resource group of expert ESD instructors from numerous departments. This group was assigned with approaching the rest of the Chalmers teachers and program directors with the goal of incorporating ESD into the educational program.

The goal was to improve both the quantity and quality of ESD integration, foster instructional methods in both instructors and program directors, and to provide teachers and program directors with a general understanding of the program in question, which is its ESD content.

They focused their work on generating procedures of learning that nurtured ESD competencies to reach as many people as possible in the academic organization, and at as many levels as attainable.

The group sought to learn about the motivations for incorporating ESD into courses and programs, which could include possibilities for advancement within the academic system, resources at hand, expectations from administration of education, and university regulations, among other things. They completed tasks that resulted in an increased level of ESD integration at the university. The main components of their methodology are a group engagement method implemented through faculty seminars based on educational programs and discussions.

Many diverse themes were laid out and addressed during these workshops, such as what makes up the quality of ESD in educational programs and the many opinions of stakeholders on the present state of ESD at the institution. Examples of successful initiatives to embed ESD within the university were also addressed, as were drafts of documents outlining fitting ESD learning goals and competencies such as leadership and critical thinking skills.

According to the findings of the study, students who get ESD coursework displayed considerably greater levels of self-perceived action proficiency for sustainability than those who weren't given ESD instruction. Students that received ESD instruction exhibited greater understanding of action choices, belief in their personal influence, and readiness to act. The study also discovered that students who got ESD instruction had a more holistic and pluralistic vision of sustainable development, implying that ESD instruction can assist students in understanding the interdependence of environmental, economic, and social challenges.

The holistic approach of sustainable development recognizes that environmental, economic, and social issues are inextricably linked and must be addressed concurrently to attain sustainability. This implies that approaches to environmental issues must take economic and social factors into consideration and vice versa.

The pluralistic approach on sustainable development acknowledges that there are numerous perspectives and ideas on how to realize sustainability, and that these different viewpoints must be acknowledged and thoroughly assessed to generate successful solutions. This includes allowing for various viewpoints and perspectives, as well as fostering critical thinking and getting involved throughout decision-making processes.

The holistic and pluralistic perspectives on sustainable development, taken together, underline the need of considering the multifaceted and intertwined nature of sustainability concerns, as well as a requirement for cooperative and collaborative methods to identify solutions.

The study recommends ESD instruction ought to be incorporated into the curriculum in a methodical and extensive conduct, and that instructors be trained and supported to successfully instruct ESD. Future research should use longitudinal designs to evaluate the long-term impacts of ESD instruction on students' action competence for sustainability, according to the study. The research demonstrates that educating about ESD can be an efficient way for fostering sustainable development and inspire students to initiate action toward a more sustainable future (Olsson et al., 2022).

ESD must thus be viewed as a long-term activity that needs to be performed out slowly over an extended period. New employees must be familiar with the work being done so as not to risk all the progress. If an awareness of accountability can be spread to many individuals on various levels, it is going to render the task easier, both in terms of achieving the necessary adjustments and boosting the level of understanding and awareness throughout the institution.

4.6: Malaysia

Malaysia offers a comprehensive environmental education curriculum that covers ecology, sustainable development, and environmental challenges. Tests, coursework, and project

work can all be used to assess students. Education officers and master trainers receive in-service training as well. Non-governmental organizations (NGOs) play an important role in informal environmental education and advocacy.

To advance the goal of fostering sustainable consumption habits, this study examines the growth of environmental education and ESD in Malaysia. Sustainable consumption and production can be considered a practical application of ESD because they involve changing the way goods and services are made and consumed. This necessitates education and awareness-raising efforts to promote sustainable lifestyles and habits. ESD may help by educating people and communities about the importance of sustainable production and consumption, as well as providing them with the knowledge and skills necessary to make more sustainable decisions.

ESD has been integrated into Malaysian secondary and higher education through a variety of projects and programs. Environmental education is now included in all secondary school curriculum, with the purpose of teaching students to be more aware of and concerned about environmental issues. The curriculum is comprised of six major principles that are taught in all curriculum subjects. Some of the topics covered include natural resources, environmental management, environmental ethics, environmental education, and environmental technology.

The nation's leading public universities have led innovative ESD initiatives at the higher education level. Projects for community participation, research, and the development of ESD courses are among these efforts. To promote research and education on sustainability issues, the University Sains Malaysia has established the Centre for Global Sustainability Studies. The Center provides a master's program in Sustainable Development and Management with the goal of producing graduates capable of addressing sustainability concerns in a variety of professions. In addition, the center conducts research on sustainable development issues and offers educational and advising services to both commercial and public enterprises.

Another example is the Center for Environmental Sustainability and Water Security at the University Teknologi Malaysia (UTM), which was founded to support study and instruction on environmental sustainability and water security challenges. A master's program in environmental sustainability and water security is offered by the IPASA with the goal of producing graduates who can handle environmental sustainability and water security issues in many

industries. In addition, the center conducts research on environmental sustainability and water security challenges, as well as providing training and consulting services to government organizations and the commercial sector. In addition to these designated centers, many Malaysian universities have included sustainability education into their curricula. Universiti Malaysia for example, has integrated sustainability education into its undergraduate curriculum, with courses such as Sustainable Development and Environmental Management available to students from all faculties. A Sustainability and Green Campus Committee manages sustainability efforts on campus and promotes sustainable practices among students and faculty. It is a leader in green campus initiatives within Malaysia. Their program, Green@UPM, focuses on transforming the university into a model of sustainability through various environmental management practices and educational programs.

Green@UPM's success is evident in their consistent high rankings within the UI GreenMetric World University Rankings. For nine consecutive years, UPM held the third position globally and the top spot in Southeast Asia. This recognition reflects the university's unwavering commitment to environmental responsibility.

One significant initiative under Green@UPM is the "Zero Waste Campus" program. This program aims to minimize waste generation and encourage sustainable practices within the campus community. It emphasizes the principles of Reduce, Reuse, Recycle, and Repair, promoting a more environmentally friendly approach to daily activities on campus.

In a nutshell, ESD has been implemented in higher education through a combination of official education programs, research, and community engagement projects. These projects seek to generate graduates capable of tackling sustainability concerns across several industries and contributing to the accomplishment of sustainable development goals.

However, there are other barriers to ESD adoption in Malaysia, including a lack of policy integration. Even though environmental education is already part of the secondary school curriculum, Malaysia has no official policy on ESD. It is challenging to guarantee that ESD is applied efficiently and uniformly across all educational levels because of this lack of policy coherence.

Another issue is teacher education. Instructors play an important role in ESD implementation, yet many Malaysian instructors lack the essential knowledge and resources to effectively teach ESD. This might lead to students' lack of understanding and engagement. Fur-

thermore, many Malaysian schools lack the necessary resources, such as financing and infrastructure, to properly execute ESD projects. This has the potential to limit the scope and impact of ESD programs.

In addition, ESD necessitates the involvement of the larger community, which includes parents, NGOs, and local governments. However, community engagement in ESD programs in Malaysia is generally minimal, which might limit their effectiveness. Despite efforts to promote ESD, there is still a lack of public awareness and understanding of the idea in Malaysia. This can limit the level of support and participation required to effectively implement ESD projects.

To ensure that ESD is successfully integrated at all levels of education in Malaysia, all stakeholders, including the government, educators, and the public, will need to work together to address these difficulties.

The report makes some recommendations for ESD in formal education, notably for Malaysia, including the maximum level of integration of environmental education and ESD. Including thorough and organized environmental education and ESD practices in high school curricula is another important step. In addition to supporting school-led, sustainable consumption production greening efforts under the direction of teachers or parents, as well as fostering whole-school environmental management and protection through programs like the Sustainable School Award.

Furthermore, non-governmental organizations (NGOs) are urged to teach students about practical activities for living a sustainable lifestyle. Finally, developing a new learning and teaching approach needs active engagement at the senior levels of education policy and decision-making, as well as encouraging universities to lead pioneering ESD programs that are flexible and applicable to many contexts and education systems.

4.7: United States

The US is actively cultivating a new generation of students who are socially and environmentally concerned, and who are prepared to take on the challenging problems of sustainable development. This changing paradigm in education shows a dedication to getting students

involved in creating a more resilient and sustainable environment. The School of Sustainability at Arizona State University incorporates problem- and project-based learning (PPBL) into all undergraduate and graduate curriculum. Class components, full workshop courses, thesis work, and foreign partnerships are just a few of the many ESD options. To help students enhance their sustainability skills, the school offers hybrid, project-based, and problem-based learning experiences. Students are prepared for upper-division courses and international partnerships through an introduction course and a cooperation with the social entrepreneurship program "Global Resolve."

Notwithstanding certain obstacles, such as the dearth of effective models to refer to when formulating a strategy, particularly in the sustainability domain, the university is creating study abroad programs with ESD chances and global ESD opportunities for postgraduate students. Instructors lead students in knowledge acquisition, methodology, project management, teamwork, and client collaboration through the curriculum. To give real-world experiences, faculty, students, and staff create a variety of sustainability development possibilities. To maintain institutional momentum, training programs in ESD are also being developed for graduate students and faculty.

Other educational institutions can learn from the ESD model, which shows how to build curricula effectively and match institutional structures to the goals of SD. Higher education institutions looking to undertake projects in sustainability education can benefit from the experiences at these institutions.

The case study focuses on Van Der Leeuw, the dean of Arizona State University's School of Sustainability, and faculty member Katharina Brundiers' efforts to include sustainability into course materials and instructional practices. More and more ESD opportunities become accessible to students as they progress through their degree programs. Regular courses include team projects, field trips, and panel discussions with professionals, city officials, and community leaders. Undergraduate and graduate students take combined workshop courses that are entirely based on the ESD paradigm, with a focus on semester-long projects with external partners or clients.

Students' voluntary involvement reflects their desire to support environmental initiatives and obtain real-world experience. Through activities, incentives are offered for high-quality education and community impact, including support for hourly student workers and faculty stipends. Students see that after graduation, job prospects are improved by the abilities they

have gained through the programs. The incentives and voluntary nature of involvement highlight students' dedication to learning real-world skills and supporting sustainability initiatives and education.

The program's outcomes include enhancing both individual and group learning, developing teamwork, communication, and project management abilities, and offering chances for worldwide project-based learning as well as external partnerships. Undergraduate and graduate students involved in ESD programs have access to a range of options, such as workshop-courses and international collaborations, to enhance their sustainability competences. Their experiences are designed to improve communication, teamwork, individual and collaborative learning capacity, and project management abilities.

Students can contribute to a variety of ways to practical urban development initiatives. For instance, as part of their efforts, a student team at Arizona University worked on creating a practical tree-and-shade manual for a neighborhood in Phoenix. This program sought to address issues of sustainability pertaining to urban development and environmental quality by offering workable ways to improve the neighborhood's green areas and shade. The student team demonstrated the practical results of their efforts by staying in touch with the community long after the course ended and managing to acquire funds for the first tree and shade initiative.

4.8: India

As the rest of the world developed in the past, sustainability was not an issue nor was it in mind in the first place. Third world countries are at a challenge now when it comes to sustainability, considering they already have enough challenges to overcome, it can be hard to also do it in an environmental-friendly way.

India is one of the many developing countries that has a plethora of major problems such as water, air, and land pollution. The development it needs is going to require an immense effort because it must consider the carbon footprint it's going to leave and of course massive funding.

To help society develop in a sustainable manner, education must intervene and qualify its individuals to be action leaders and change agents. One strategy was to implement ESD in

the program of Information and Communications Technology centers, known as ICT centers in India.

One of the centers in Telangana State is run on solar energy. It is concerned with modern societal issues such as digital illiteracy and provides training to its community members in collaboration with University of Columbia's center for SD.

In this study, facilitators from the center were interviewed to see how they implement ESD in their teaching. They were first questioned about their understanding of ESD and what it meant to them. A common understanding between all facilitators was that it meant learning to live and be one with nature therefore, ESD is supposed to help learners be responsible of whatever resources they have left and contribute to solving current problems.

Then they were asked about how they embed ESD in their teaching, the responses collected mainly compromised of teaching about issues such as pollution, waste management and degradation and hygiene. It is noted that there was no mention of economic problems.

Even though there are some challenges when it comes to ESD integration, facilitators at ICT centers have shown promise and hope for the future. The learning centers have succeeded in achieving significant learner engagement. They benefit from discussion- and inquiry-based learning. With internet being provided, information is easy to get to and students become cognizant and sympathetic of problems in the immediate surroundings.

Facilitators at ICT focus on tangible issues that learners can witness and interact with rather than just learn about in theory. Such issues are instructed with an extensive use of videos, articles, and real news. Discussions that follow are a great way to stream thoughts and foster critical thinking as well as group presentations. This allows for the exploration of multiple points of views.

These centers have also partnered with a government program named "Bring Your Own Bag" which mainly focuses on using fabric that has been recycled to produce bags. In the process of learning, students learn about the effect of plastic and pollution and gain a deeper understanding of the repercussions of it. Not only will the students have learned a new skill but also gained a great awareness of the methods of production and consumption that have led to today's sustainability problems.

This strategy is an excellent ESD implementation. One of the most significant techniques for enabling learners to comprehend the gravity of SD challenges is to encourage them to

learn about SD through learned-centered training. Knowing the root of these issues and their effects, aids in finding solutions and promoting sustainable behavior in the community.

According to the ICT centers, learners have taken their knowledge beyond the walls of their classroom. They adopted what they have learned and practiced it in their daily life. They also encouraged their peers to practice sustainable actions. They have also taken extra courses that promote SD and shown a great interest through independent research. This proves that when instructed in a right manner, ESD can be not only of the government's interest but also of individual citizens.

4.9 Nigeria

Nigeria is a country wealthy in natural resources such as oil, but it is also one of the poorest in the world, with relatively little investment in human capital. Human resources are one of the most crucial aspects of a country's development, and Nigeria appears to be lacking in this area as well.

Investing in people's education can have a direct impact on the economy's growth. When we look at a country like Nigeria, we observe that the country's education system is in desperate need of renovation; there is a significant gap between education and labor market needs, which indicates that the system is obsolete and unsustainable.

Students' quality of education has been disregarded for so long now and almost little to no attention has been given to its development, teachers have also been victims of this neglect with around 47% of them being unqualified. Therefore, when it comes to ESD Nigeria is among the countries that are struggling to achieve SDGs due to many challenges the country faces.

Nigeria has set a plan to transform its education into a tool to achieve SDGs. It has given strong emphasis on the integration of ESD into its programs to promote and develop sustainable manners into the lifestyle of its citizens. Still, this boost of awareness of SD imposes many challenges as it requires great funding and the adequate infrastructure for it, both of which Nigeria lacks.

In this study, which mainly relies on government reports and documents, we see that despite Nigeria's plans and efforts ESD almost doesn't exist within its policy. It is noted that Nigeria itself has failed to document the challenges that ESD implementation faces.

The first challenge in Nigeria's ESD integration is the absence of the needed funding. A higher budget for education must be allocated to be able to proceed with ESD. Unfortunately, Nigeria's budget for education keeps getting lower by the year which makes it harder for educational institutions to have quality education.

Next is the lack of qualified staff for ESD. Successful integration requires professionals in the field of sustainability that can not only raise awareness but also foster sustainable manners in individuals. To be able to have a sufficient supply of ESD educators' partnerships must be made with international institutions and a specific sustained budget must be allocated.

Another notable challenge is the poor infrastructure. ESD requires special facilities and up-to-date educational technology services that foster its integration and ensures a smooth transition. Besides, ESD is not legally recognized in the education system in Nigeria which makes it difficult to set a strategy for its implementation. ESD is not set as a priority by The National Universities Commission Act, and the Tertiary Education Trust Fund Act which hinders the integration of ESD.

To assist the development and implementation of ESD programs in Nigerian higher education, ESD must be clearly incorporated into all educational regulations and policies. This will not only place ESD at the top of the government's priority list, but it may also result in greater funding and financial allocations for ESD initiatives and programs across Nigeria.

4.10: Lebanon

Lebanon is considered a third world country; however, it is part of the higher developing ones on the list. It has been through multiple civil wars and revolutions. With the recent port explosion and the rising rate of inflation, achieving SDGs is becoming more and more of a challenge by the day.

ESD has a growing presence in HE institutions. For example, in the American University of Beirut (AUB) a partnership has been formed with the United Nations Global Compact Network (UNGCNL). This partnership's goal is to offer learners a platform that facilitates the exchange of knowledge and promotes dialogue on SD policies. The partnership took place at the faculty of business in AUB.

To ensure that learners play a role in achieving the SDGs, the GNCL launched a "Brain Lab" initiative that challenged students to develop sustainable solutions and plans for pertinent SD challenges. They collaborated with the Faculty of Agriculture and Food Sciences and focused on renewable resources in the realm of Water Energy Food (WEF).

Learners' accomplishments in the field of health provide a fresh perspective on entrepreneurship that is rooted in AUB's basic values as an institution primarily dedicated to providing educational and health services in Lebanon and the region. Students were invited to participate in the Brain Lab, an encouraging program aimed at supporting and inspiring tomorrow's change leaders, as well as motivating Lebanese youth to pursue the SDGs. This program creates the framework for other educational institutions to participate and help achieve the SDGs.

Another project worthy of mention is one which took place during the pandemic when power shortages were on the rise and water salinity levels were at risk. In the past the water well was able to meet all needs, but not anymore. The low levels of rainfall and water extraction left the campus' water well saline, so the university set a plan with the support of hands-on learning and existing infrastructure for responsible consumption of fresh water was designed to alleviate the newly increasing salinity.

This project was not only limited in application to the university's campus instead it took a larger scope. Students were further instructed and provided with the knowledge needed on water salinity to avoid the increasing consumption of fresh water. The learning that took place was a hands-on, problem-solving method that promotes decision making and critical thinking skills.

AUB is currently leading another outstanding concept for the coming years through the field of irrigation-related applied machine learning research. The ongoing worry over drought is now a global problem due to the progressively noticeable consequences of climate change and modern manufacturing needs. With the right planning, unanticipated events like droughts and food shortages can be overcome, based on the Internet of Things.

Most of the irrigation research being conducted now by the department of agriculture focuses on machine learning and advancements in satellite-based predictions of irrigation demand. The IoT in action is best exemplified by the potential to create precise algorithms utilizing Google Earth that would guide consequential programming connected to agronomical techniques. Teaching sustainability and including it as a learning outcome in curriculum are the first steps in realizing the vision of present SD and creating a world where everybody sufficient access to food.

Also, a 100-hectares plot was designated for the center of Advancing Research, Enabling Communities (AREC). This facility is the pinnacle of agricultural engineering and epitomizes science in methods that are as practical as it gets. AREC pioneered new production techniques and advances in several fields ranging from poultry to agricultural production to other fields.

The following table serves as a summary for the above mentioned countries.

Table 1.2: ESD Implementation in Higher Education: A Global Comparison

Country	ESD	Implementation Strategies	Discipline	Key Actors	Challenges
Italy	Yes	Whole-university approach: Green buildings, sustainable practices (energy, waste, food), curriculum integration (likely across disciplines)	Engineering, Architecture, Environmental Science, Business (food)	University of Florence	Resistance to change - Financial investment - Regulatory hurdles
Spain	Yes	Teacher training: Service-learning course on Sustainability & Innovation (focus on social and ecological aspects)	Education (focus on social sciences and ecology)	University of Extremadura	Time constraints - Limited resources - Balancing technical and social aspects of sustainability - Ensuring meaningful community engagement
Qatar	Yes	Curriculum & Campus Integration: Focus on behavior change, integrating sustainability throughout curriculum (likely across disciplines)	Various (depending on the curriculum integration)	Higher education institutions in Qatar	Students have low awareness and behaviors towards sustainability despite knowledge - Social media, news, family & friends are main sources of sustainability knowledge - Traditional education has minimal impact

		and campus operations (facilities, resources)			
Japan	Yes	Curriculum & Community Engagement: Development of ESD programs (interdisciplinary), community learning initiatives (ecological and social awareness)	Interdisciplinary (likely ecology, social sciences)	People of academia	Future research is needed to confirm the effectiveness of programs
Sweden	Yes	Curriculum & Faculty Development: Resource group promoting ESD integration, workshops for faculty (focus on integrating ESD into their disciplines)	Various (depending on faculty disciplines)	Chalmers University of Technology	ESD instruction needs to be methodical and extensive - Instructors need training and support to effectively instruct ESD
Malaysia	Yes (Limited)	Multi-pronged approach: Environmental education in curriculum (likely ecology-focused), university-led sustainability projects (varied disciplines)	Ecology (curriculum), Varies (projects)	Leading public universities (e.g., Universiti Putra Malaysia)	Lack of policy integration - Teacher education gaps (knowledge, resources) - Limited resources (funding, infrastructure) - Minimal community engagement - Low public awareness
United States	Yes	Project-based learning (varied disciplines), Courses with real-world application & community engagement (social and ecological issues), International partnerships (broad sustainability perspectives)	Varies (depending on projects and courses)	Universities with dedicated Sustainability Schools (e.g., Arizona State University)	Limited effective models for broader implementation - Need for faculty training in ESD
India	Yes (Partially)	Community Learning Centers: Teaching about environmental issues and promoting sustainable practices	Ecology	ICT centers	Limited focus on economic aspects of sustainability - Challenges integrating ESD due to resource constraints

		(waste management, pollution) through ICT centers (likely ecology focus)			
Nigeria	No	National Policy & Planning (weak implementation): ESD integration into national education system (all disciplines)	All disciplines (intended)	National government	Lack of funding for ESD programs - Shortage of qualified ESD educators - Poor educational infrastructure - Lack of legal recognition for ESD in the education system
Lebanon	Yes	University Partnerships & Hands-on Learning: Collaboration with organizations for SD dialogue (broad sustainability), student projects on water management (ecology) and agriculture (ecology and economics)	Various (depending on partnerships and projects)	American University of Beirut	Challenges due to political instability and economic crisis

CHAPTER 5

RESULTS, DISCUSSION AND SUGGESTIONS

5.1. Results and Discussion

Several countries have attempted to include ESD into their higher education institutions, each with their own strategy. However, there is a lot of ambiguity when it comes to the transformation process. The outcomes of the case studies are discussed in this chapter. The results will be split into two sections. In the first section, we will look at how ESD was adopted in higher education. In the second section, we will look at the issues and obstacles that the embedding process brings.

5.1.1. Best Practices

We'll start with Qatar's case in the first section of our results chapter. We see that they began their method by examining the degree of awareness of SD with a questionnaire. The findings demonstrate that Qatari HE students are aware of SD, but their application and conduct aren't as strong as their knowledge. This demonstrates that while people are aware, they lack the initiative to be change agents, ESD has yet to enter the practical change process.

According to Verhaulst's (2012) change concept model, Qatar is at the finish line of the preparation stage, with a well-aware and organized SD culture. It has not yet entered the integration phase, which necessitates a clear set of policies. Students' understanding of SD is a good indicator of great drive for change, resulting in very low resistance to change.

Japan has taken a different approach to implement ESD into its HE curriculum. In the case we have studied earlier we explored two strategies implemented by HE students from two different cities. The first strategy implemented is the Okyama Model where both students and citizens of local communities were involved in the process. Its main target was to promote public health and environmental awareness through local events and activities and these events are to be organized by HE students. For Okayama students, this experience was part of their HE extracurricular events.

It is noticed in this model that a teaching-learning process takes place however it is not any random process, it is an SD-based approach which is even more efficient. When change agents (in this case the students) serve as instructors, they automatically feel the need to delve deep into SD and get a hold of its details. This improves their comprehension while

also increasing their self-confidence. It empowers and inspires them to accomplish more and be a bigger part of the transformation process, while also strengthening their leadership skills.

The second strategy adopted by Japan is by HE students in Tokyo. Students were asked to plan, since the city is diverse and metropolitan, to help individuals be in harmony with their environment during chaos and underlying poverty.

Students formed a youth club in which they were required to develop community projects to support SD in their city and improve public awareness of its significance. This approach is also crucial for developing critical thinking, problem-solving, and capacity for leadership. Students who have a solid set of skills are more likely to have greater employability opportunities and to thrive in their professions. Dealing with people from various backgrounds also acts as a tool for pupils to understand the diverse types of individuals they may encounter in their future. It also helps children grasp the significance of other "different" civilizations.

Both strategies show similar results. Meaning, the inclusion of HE students in SD projects increases their environmental awareness and teaches them how to deal with outside organizations and stakeholders to work for the success of their project. However, it was accepted that there is a scarcity of ESD-related human resources. Additionally, identifying locations for such groups and communities should be easier. For example, special halls or spaces can be designated for ESD events in which both students and residents can participate. These specified areas will be crucial in increasing SD awareness.

Some universities have taken a different approach to SD. For example, in Italy the university of Florence helps raise students' awareness of SD by integrating it into their environment and surroundings. They have green campuses, use sustainable resources for energy for heating systems and follow energy saving techniques. They also encourage students to carpool and reward them for it.

Moreover, they use solar panels and promote the utilization of eco-friendly materials on campus. Academic wise ESD is being offered as a course and as workshops. Research centers for SD have been set up for students on campus too. The institution also maintains a presence on social media and uses it to raise awareness of SD.

The university arranges programs and encourages bio-diversity preservation in the community. As a result, we can notice that the university has included university stakeholders, students, and local citizens in SD. This optimizes the effect of ESD and spreads it into the community not just on the university level.

Very similar to Italy, Spain asked its students to come up with solutions to real world local problems as their project. This was mostly required for STEM majors. They had to think of innovative ways to preserve their heritage and not just learn about it. It was putting theory to practice in a sustainable manner. They also had to include members of the community and collaborate with them since they are working on a local issue.

Sweden on the other hand decided to test and see if it is possible to develop students' competence to take ESD oriented actions if SD was focused on through teaching, in both holistic and pluralistic approaches. It was revealed that the more explicit the instruction was the higher self-competence the students showed for SD in comparison with those who have not yet received any direct or explicit ESD.

The instruction they received encompassed all aspects of SD and presented them various ways of acting for change and decision making, all of which fostered their critical thinking. When confronted with a wide range of issues, from environmental to economic and social, students get a greater grasp of how sustainability might help find a solution. However, simply exposing students to such concerns is insufficient; they must also be able to contribute to the solution. In this scenario, teachers must train and educate students in practical ways, rather than merely theoretically.

Malaysia chose to focus on a different part of SD in its education, it targeted consumption and production habits and focused on practical applications of ESD. Malaysian communities get ESD through both formal and non-formal education since ESD is not restricted to educational institutions.

Public universities have been advocating for SD for quite a while now. On campus initiatives incorporate a special focus on consumer habits. For example, in one other university there is a project titled white coffin which aims to prohibit the use of polystyrene based containers. Other projects include advocating the use of reusable bags, recyclable plastic and using bananas to make paper through technology. These projects form communities of individuals that thrive on sustainability.

Also, there are research centers dedicated for SD. These centers serve as a space for learners to share and build on prior experience for more efficient SD. Besides the extra-curricular academics and volunteering, some universities offer SD as a stand-alone master's degree or as an elective on the postgraduate level. This type of intensive education produces a highly skilled batch of individuals that have an in-depth perspective on sustainability issues.

The outcomes of the PPBL initiatives at Arizona State University's School of Sustainability benefit sustainability by providing students with opportunities to engage in real-world sustainability research and projects, developing skills such as systems thinking, anticipatory competence, normative competence, strategic competence, and interpersonal competence. The curriculum also attempts to help students transition into professional practice, thereby improving their sustainability skills.

Additionally, the initiatives have led to tangible outcomes in communities, such as the initiation of a community garden through the application of research results from students. The program's efforts to maintain institutional momentum and make progress after the initial launch also help to ensure the long-term incorporation of sustainability concepts into education and practice.

These findings show that PPBL has the potential to positively address local and regional sustainability challenges while also building capacity in advanced graduate students and teachers throughout the university. Furthermore, the program's publications help to promote institutional reform and mutual learning among the local community and wider circles of interested educators and students. The findings can inform and assist the continuous transformation in sustainability education, with the goal of preparing students to address and solve real-world sustainability problems while professionally cooperating with partners from government, business, and civil society.

In developing countries like India and Nigeria, ESD has a weak presence and little research. That is because such nations are concerned with more pressing issues regarding their economy and infrastructure. One of the ways that India opted for was through its ICT centers. Even though instructors may not have received any proper ESD teaching training, they are aware of SD issues and express their dedication to address them in the classroom. Students are exposed to real world issues that they can interact with and are taught how to tackle them through flipped classrooms and group learning. The strategy followed has proven to be successful, it let the learners understand the root of the problem, its effects and how they can

come up with ways to sustainably face these issues. The fact that learners willingly come back for more courses is enough proof that these centers have successfully an SD mindset in its students. However, Nigeria has failed to display any sign of ESD in its system due to the dire state of the country and the failure to meet the needs of basic quality education in the first place.

Lebanon, on the other hand, has set a goal to achieve ESD integration in HE despite economic obstacles. Several colleges encourage group learning and offer students with the information they need to handle environmental challenges. The education is centered on active learning, in which students learn by doing and being a part of the changing process.

5.1.2. Challenges faced

Moving on to the next section of our chapter, we will discuss the issues that HE faces while integrating ESD. The first and most significant difficulty that all HE institutions encounter is opposition to change. This is natural because anything new and different is a difficult process that can be difficult to grasp at first. Staff and student resistance to change is quite typical, but it will disappear with time. This is because, with training and teaching, this adjustment becomes the norm and poses no complications.

Another common challenge faced is the lack of funding. Integrating ESD into HE institutions is a complex process that requires investments in almost all fields. Teachers require special training and workshops to be able to teach for ESD, the more they are aware of SD issues the better they are at instructing it and making sure they raise an SD aware generation. To apply this, there must be a dedicated area for students to form communities and be able to work together. Also, more funding is needed to build research centers for those working on SD issues with the needed technology equipped. Besides funding, institutions are usually presented with deadlines which poses a time constraint because there will be limited manpower and resources.

Finally, to be able to fully optimize ESD, students must work with local members of their society which means they need to find organizations and NGOs to partner with so that they can have a designated place to meet and to use as a local resource to boost ESD. This issue is usually manageable as a lot of NGOs are now highly interested in working with community members towards achieving SDGs.

People are our highest value capital and our biggest investment. By embedding ESD into HE, we make sure that the following generation to come is not only highly aware of SD

issues but also able to act on them and make decisions. Future learners must be taught to be become responsible leaders concerned about the future of the earth (Didszun and Bormann, 2016)

ESD plays a significant role in higher education. It encourages critical thinking, empathy, problem-solving, and leadership abilities, all of which are increasingly valued in higher education institutions. One of the important components that SDGs inside curricula stress is focusing on these skills and concepts while correctly giving courses to students. Implementing such ideas will connect students closer to their surroundings and encourage them to think about and engage in solving current problems (Bourn et al., 2017; Griswold, 2017) actively and critically.

Higher education institutions strive to instill in students the belief in the power of their actions, allowing them to actively participate in SD issues. Many universities concentrated on this, as noted in the results section, by providing students with real-life challenges and challenging them to find practical solutions. The learning they experience in this case is action-oriented which therefore increases their self-efficacy to act in the future (Ojala 2016; Östman, Van Poeck, and Öhman 2019; Sinakou et al. 2019).

Students that have not been exposed to ESD believe that SD issues are mostly environmental. When teachers investigate different SD concerns, not just environmental ones, students find themselves dealing with a wide range of SD issues that they have been overlooking for a long time. Realizing that SD is about more than simply biology, people feel empowered to participate and be a change agent.

Teachers should continually assign mentally hard activities to students to expand their knowledge and allow them to think beyond the box. As a result, it is critical to assist instructors in adjusting their ESD teaching practices so that students can build the abilities required to contribute to the SDGs in the long term (Nasir, 2021).

Research centers and local communities give students and citizens the chance to share and reflect on various issues and therefore foster their critical thinking and decision-making process. When discussion takes place, in-depth analysis of current problems is intensified and better solved (Priestley et al., 2015).

Speaking of the challenges, reluctance to change, absence of financing, a lack of human resources, ESD programs, and inadequate teacher preparation. The recommendations for overcoming these issues are as follows:

To get over the resistance among stakeholders, staff and students' consistent workshops and awareness must be spread beforehand. When introducing a complex issue like ESD, it is best if the ground was set beforehand. When enough knowledge and understanding has been established, change can be encountered gracefully and systematically worked on. As a result, such significant proposals are unlikely to pose a risk to the institution, but rather an opportunity to improve and modernize it. (Kim, 2017).

Lack of funding is usually what policy makers encounter the most, however by partnering with NGOs and local organizations support can be gained. Since SDGs is part of what every nation is aiming to achieve by 2030, NGOs are usually available to fund projects that work in the favor of sustainability. They can provide the financial funding, local spaces, and qualified personnel. The more we work on our communities from within HE institutions the more we will have qualified personnel to aid in the implementation process (Murphy, 2013).

When setting an ESD plan a lot of complexity is faced. There is no clear set of rules or policies that facilitate the process which makes it hard to successfully implement ESD in some HE institutions. As a result, when using ESD in HE initiatives, the scope is usually limited and done on a small scale. The implementation phase necessitates a well-designed strategy with the required evaluation tools, which tend to be absent (Wamsler, 2020).

ESD should be integrated into all courses not only science-based ones. This will make sure that an equal opportunity for all students is provided to be change agents and leaders of the future. A well-designed curriculum for all courses must be set in place and teachers must know how to engage all students and help them be part of the change (Fissi et al., 2021).

Regarding teaching training, instructors must be highly aware of SD issues. In fact, they must be action-oriented and leaders themselves first, when this is achieved, they can go on to pass their knowledge to future generations. They must follow modern teaching strategies like flipped classrooms and make sure learners are part of the teaching process than passive listeners. Students learn best by doing not by merely being in the classroom, project-based learning is ideal for maximum learning outcome (Oe et al., 2022).

To summarize this research, ESD is recognized to be a complex approach when it comes to integrating it in the curriculum because there is no one set of guidelines to apply or a list to check off. The key to ESD is its flexibility and adaptability to the content at hand, which can be hard (Leich et al., 2018).

To accomplish the SDGs, ESD must be embedded in higher education through a well-planned policy and a clear set of goals. Student participation is emphasized as a priority in the process because they are our most precious resource. Critical thinking, decision making, and problem-solving skills must be developed to assist individuals improve their learning experience and get the best results (Chams, 2019).

Of course, new challenges will arise upon all new change processes especially when the change is integrating ESD in the curriculum as it is not a simple proposal. Most faced is the lack of finance and opposition to change. Given the complexity of the project, a significant investment is required, which will necessitate multiple partnerships with local organizations and NGOs. Furthermore, for ESD to be implemented smoothly, all stakeholders must support and believe in the ESD notion. Quality training in the field of sustainability must also be provided beforehand to management and staff, this will guarantee a smooth and efficient application of ESD. Clear policies and regulations should be set, and consistent evaluation and active discussion will pave the way for additional suggestions and recommendations to improve ESD implementation (Sterling, 2015).

Building on previous achievements, we need to create new evaluation instruments. These instruments will carefully monitor the effects of sustainability on education, faculty development, and the community by fusing formative and summative components. Clearly defined programs that increase faculty and student capacity are essential to growing the pool of enthusiastic, competent teachers who can support possibilities for sustainable growth. When combined, these tactics have the potential to cause institutional values shift from the ground up. This will be accomplished by fostering an active community of instructors and students who are motivated to take the lead, get involved, and recognize the importance of sustainability education (Rodríguez-Solera and Silva-Laya, 2017).

5.2. Suggestions

The current study has provided valuable insights into the current state of Education for Sustainable Development (ESD) programs in higher education. While the findings offer a foundation for understanding the immediate effects of these programs on student knowledge acquisition, a crucial gap remains – the long-term impact on student behavior and career

choices. Addressing this gap and further enhancing the effectiveness of ESD programs requires a multifaceted research agenda. This section outlines key areas for future research, first by highlighting the need for longitudinal studies to assess the enduring influence of ESD programs (Section 5.2.1). Following this, Section 5.2.2 explores a range of promising avenues for expanding the scope of ESD research, focusing on innovative delivery methods, interdisciplinary collaboration, and effective teaching and assessment strategies. By delving into these areas, researchers can contribute significantly to the advancement of ESD programs, ultimately empowering them to effectively prepare future generations to address the critical challenges of sustainability.

5.2.1. Suggestions based on Results.

The current study offers valuable insights into the current state of Education for Sustainable Development (ESD) programs in higher education. However, a crucial limitation lies in the absence of long-term data on student outcomes. Understanding the long-term influence of ESD programs on student behavior is essential to gauge their effectiveness in promoting sustainability. Therefore, a primary area for future research should involve comprehensive longitudinal studies.

These longitudinal studies should track student attitudes, actions, and career choices related to sustainability over a significant period after their participation in ESD programs. Ideally, the studies would follow students throughout their academic careers and into their professional lives. This long-term data would provide invaluable insights into whether ESD programs are truly fostering a generation of sustainability-minded individuals equipped to address the complex challenges facing our planet.

The design of these longitudinal studies requires careful consideration. Researchers must develop reliable and valid instruments to measure student attitudes and behaviors related to sustainability. Additionally, they must establish protocols for maintaining participant engagement over the extended timeframe of the study.

By addressing these challenges and conducting rigorous longitudinal research, we can gain a deeper understanding of the long-term impact of ESD programs. This knowledge is crucial for informing the development and refinement of ESD programs to ensure they are effectively preparing students to become future sustainability leaders.

Longitudinal research holds particular importance in the context of ESD. Unlike disciplines with more readily observable outcomes, the impact of ESD programs on students' attitudes and behaviors towards sustainability may not be immediately apparent. Longitudinal studies allow researchers to track these changes over time, providing a more comprehensive picture of the program's effectiveness in achieving its long-term goals.

Moreover, longitudinal research can shed light on how ESD programs influence students' career choices. By tracking participants' professional trajectories, researchers can determine whether exposure to ESD programs leads students towards careers that contribute to a more sustainable future.

Ultimately, the insights gleaned from longitudinal research are critical for informing the development and refinement of ESD programs, ensuring they are effectively preparing students to become responsible citizens and leaders who can address the critical challenges of sustainability.

5.2.2 Suggestions for Future research

While assessing long-term impact is crucial, future research in Education for Sustainable Development (ESD) should also explore innovative ways to enhance the delivery and effectiveness of these programs. The rapid advancement of technology presents exciting opportunities, alongside the need for fostering interdisciplinary collaboration and developing innovative teaching and assessment methods.

The rapid advancement of technology presents exciting opportunities for enriching ESD programs. Virtual simulations can immerse students in real-world sustainability challenges, allowing them to experience the consequences of different choices in a safe and controlled environment. Imagine students grappling with water management decisions in a virtual drought scenario, or navigating the complex trade-offs involved in renewable energy development. Similarly, online platforms can offer flexible and accessible learning opportunities, expanding the reach of ESD programs to geographically dispersed or time-constrained students. Busy working professionals or students living in remote locations could access high-quality ESD courses through online platforms, democratizing access to sustainability education. Future research should focus on the pedagogical effectiveness of these technologies

and their seamless integration into existing curricula, maximizing their potential in ESD education.

Sustainability challenges are inherently complex, requiring solutions that transcend traditional disciplinary boundaries. Encouraging collaboration between faculty from various academic disciplines allows ESD programs to provide students with a holistic understanding of sustainability issues, encompassing social, economic, and environmental perspectives. For instance, an ESD project might involve collaboration between engineers, economists, and social scientists to develop a sustainable housing model for a developing community. This interdisciplinary approach allows students to see the interconnectedness of these issues and develop the skills needed to work effectively in collaborative teams to address real-world sustainability challenges. Future research should investigate the most effective models for interdisciplinary collaboration in ESD projects. This could involve strategies for overcoming communication barriers often present when working across disciplines, fostering productive teamwork, and assessing the impact of such collaboration on student learning outcomes related to sustainability.

The ever-changing complexities of sustainability challenges necessitate the development of innovative teaching strategies and evaluation techniques. Static, traditional pedagogical methods, such as lectures and rote memorization, may not adequately equip students with the critical thinking, problem-solving, and collaborative skills needed to address these issues. Future research should focus on the development and assessment of innovative teaching strategies that promote active learning, critical reflection, and collaborative problem-solving in the context of sustainability. This could involve project-based learning experiences where students work in teams to develop solutions to real-world sustainability challenges in their communities.

Traditional assessment techniques may not fully capture the depth of student learning related to sustainability. Therefore, research into developing alternative assessment methods is crucial. These methods should go beyond rote memorization and encourage students to demonstrate their understanding of sustainability principles through real-world applications. This could involve competency-based assessments that evaluate students' ability to apply sustainability principles to solve problems, project-based evaluations that assess students' research, critical thinking, and communication skills in the context of a sustainability project, and qualitative inquiry methods that explore students' evolving perspectives and values related to sustainability.

By delving into these areas, future research can contribute significantly to the advancement of ESD programs. Understanding how to leverage technology effectively, foster productive interdisciplinary collaboration, and develop innovative teaching and assessment methods will ultimately enhance the delivery and effectiveness of ESD programs, empowering students to become future sustainability leaders.



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