< ANALYSIS OF SUSTAINABLE INFRASTRUCTURE ENHANCEMENT IN EDUCATION INSTITUTIONS>

by

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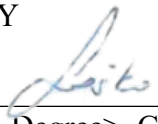

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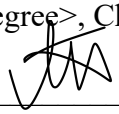

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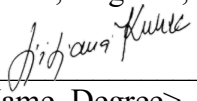

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ABSTRACT

< ANALYSIS OF SUSTAINABLE INFRASTRUCTURE ENHANCEMENT IN EDUCATION INSTITUTIONS>

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The UN Global Commission on Environment with Development defines sustainability as meeting present needs without hindering future generations from meeting their own needs. It involves ensuring equitable sharing of resources, generating profits, and maintaining an environment that supports health, productivity, and cultural life. Sustainable development fosters economic prosperity and preserves the environment and limited resources. It also emphasizes providing essential educational facilities to meet student demands. Green management (GM) refers to environmentally responsible organizational practices, which enhance health, comfort, and productivity for workers. GM guidelines improve building performance, as noted by PAEVERE and BROWN. Sustainability and GM aim to utilize and maintain infrastructure in an environmentally friendly manner.

Research methodology of design, The survey focuses on the performance of an education facility as the dependent variable. Independent variables were divided into sections in the questionnaire, specifically addressing demographic status and factors such as familiarity with the concept and perceptions of sustainable buildings. Both a control group and an

experimental group were utilized. The control group design did not involve a comparison. Raven's Progressive Matrices indicated similar intellectual abilities in both the control and experimental groups. Quasi-experimental designs do not involve random sampling or random assignment of participants to groups.

Data collection process, the data were analyzed using IBM-SPSS, version 2. Factor analysis was conducted on 32 observed variables using Principal Component Analysis (PCA) to determine the impact of independent variables on the dependent variable. The dataset met the necessary prerequisites and assumptions for using this tool. A total of 164 university instructors, 122 postgraduate students in the built environment, and 114 in-house building specialists contributed to the study. T-Test Analysis was employed to assess the significance of factors, which revealed barriers to utilizing sustainability and GM principles for achieving objectives. Correlation and regression analyses were conducted to test the hypotheses, indicating that sustainability and GM have a positive impact on educational facilities. The research examines sustainability and GM as effective solutions for improving educational facility performance and overcoming obstacles in India. Stakeholders play crucial roles in achieving a significant turnaround in the education sector. Despite poor infrastructure, there is a growing concern for quality education, particularly in southern India. To replicate the success of Indian scholars and elevate universities globally, sustainable education facility development should be embraced. This paradigm shift requires immediate recognition from stakeholders and a departure from traditional methods of building infrastructure.

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CHAPTER I:

INTRODUCTIONS

1.1 Introduction

The primary goal of the present global trend in infrastructure building is to support the conservation of the environment, with a specific emphasis on integrating green elements into the habitat to enhance facility performance and create a healthy built-up environment. It makes sense that the assessment of any prison's performance tends to focus on a set of objectives related to user satisfaction, physical stability, and the progress of socio-economic goals.

In general, the need for sustainable infrastructure development arises when the clear danger of human activities that disregard the natural order of the environment is present. The apparent growth in building development and the growth of infrastructure facilities uses a lot of energy, land, water, and non-biodegradable materials, harming the environment. Humanity's excessive dependence on technological advancements, which ultimately causes environmental damage, encourages the inefficient use of environmental assets even more.

The fight against this degradation's expanding expression, known as heating, which has no geographic or regional bounds, is now being waged by the whole human species. Therefore, in an endeavor to free the whole globe from severe environmental problems, the ideas of sustainable and green management have gained popular recognition. The use of essential qualities, adoption phases, sequential procedures, and succession approaches may help make these intricately related concepts more understandable. Simply put, green management refers to a methodical operational technique used to guarantee the seamless functioning of sustainability and the preservation of a healthy environment. The underlying principle or concept required for the creation of sustainability and the environment is the idea of sustainability. The two concepts, operational and implemental procedures, respectively, are the main areas of attention for delivering the largest potential environmental benefits.

Since educational accommodations and the quality of learning are connected to knowledge acquisition and educational accomplishment (huang et al. (2021), pradhan and bagchi (2013)), it is impossible to boost productivity without first shifting the paradigm. Understanding sustainable management, which will enhance facility performance and encourage the preservation of a healthy environment, will indicate that this target is not achievable even though it will demonstrate that this objective is not reachable. It is possible that the lack of certain qualities, in particular green and sustainable management theories, is to blame for the poorer facility performance, the perception of a poor learning

environment, and the lower academic accomplishment in india's education systems (dang and pheng (2015), diaz-sarachaga et al. (2017)). This motivates us to evaluate how the development of environmental infrastructure affects the efficiency of educational institutions.

Education is often regarded as one of the most important allies in the process of development. No country can excel beyond the caliber of its educational system. Education is a potent vehicle for the diffusion and transmission of information. The needs and expectations of society are changing quickly, and educators need to adapt sometimes. The rising knowledge of science and technology which is accompanied by rapidly developing environmental challenges has put in motion, the upgrading of educational curriculum to suit the new developments and training the environmentally aware citizen. The difficulty of teacher education seems to be the most difficult task confronting the education system in general since no educational system can surpass the caliber of its teachers. Teaching people, especially young people, about the environment and related topics makes learning more relevant by tying it to real-world situations.

The danger to the earth's ecosystems has been acknowledged in a number of international environmental conferences as a global problem that needs the participation of many people from many cultural backgrounds to be recognized and remedied.

The Indian environmental outlook report (adb 2001) emphasized that due to environmental deterioration, human health and livelihoods, species survival, and ecosystem services that form the cornerstone of long-term economic growth are all in danger. It also notes that unless nations in the area pay close attention to fixing the vast environmental concerns, India would find it challenging to achieve long-term sustainable economic development. According to UN ep's global environment outlook report from 2000, two key contributors to environmental deterioration are the extreme poverty of the disadvantaged group and the excessive consumption of a small number of people.

Recent international gatherings have underlined the need of passing down to future generations a planet that will support the natural resources they will need to maintain life and enhance their quality of life, a mission that is of utmost significance. This calls for the environmental education and training of each succeeding generation to ensure widespread environmental literacy, which includes the fundamental knowledge related to the environment and its conservation, skills, and motivation necessary for people to participate in the solution, anticipation of environmental problems, and making their contribution to suitable development.

The modern world has many vital aspects, and development is crucial for social well-being. Yet, these advancements shouldn't put undue strain on the resources since they might damage the ecosystem. The idea of sustainable development brings together the urgent need for environmental, social, and economic welfare.

Understanding and appreciating the connections between environmental well-being and human well-being will be essential for both solving present environmental problems and avoiding the emergence of future ones. While this is going on, many of these relationships are not immediately obvious. For people to comprehend the connections between environmental and development difficulties, be motivated to take appropriate action, and have the skills required to do so, environmental and development concerns must be made known to them.

Several experts and notable people have made predictions on what would happen to the world if the current catastrophic conditions on the planet continue. This is how the idea of protecting and conserving the world first emerged. To some degree, several interventions were designed and implemented, but they were unsuccessful in stopping the environmental destruction on a global scale. The developing world had begun to place greater focus on the idea of sustainable development to raise awareness and preserve the ecosystem's equilibrium.

Several environmentalists have objected to the phrase sustainable development, stating that economic strategies based on the notions of growth and constant resource depletion cannot be sustainable. Commodities like coal and petroleum are continuously depleted because they are used up far more quickly than they are produced by natural processes. The main causes of the environmental catastrophe are an expanding population, faster resource extraction, and development based on sloppy technological usage. Others fear that fossil fuel production and extraction may have already reached their peak as the globe quickly depletes its large but finite stock of fossil fuels.

The ecosystem of the world has been seen as a highly robust, self-correcting mechanism that handles all human errors and attacks on the delicate biosphere. But one shouldn't assume that everyone would share this misconception of nature. Due to its highly exploitative character, modern technology is contributing to increased pollution and severe environmental damage. This is valid for modern society development efforts in both industry and agriculture. The atmosphere contains more carbon dioxide as a result of industrial and transportation emissions of smoke and gases. Mining and industrial wastes contaminate water sources and deteriorate the land. Lakes are being contaminated by high fertilizer doses. Water bodies are impacted by soil-borne pesticide residues. Genetic diversity is decreased and desertification is accelerated by agriculture and other developmental activities.

The health of the people and ecology are directly impacted by the serious problem of air and water pollution. Thus far, inland waterways and coastal regions have been used as a landfill, which has an impact on aquatic and marine life. The phrase "environmental degradation" refers to how human activity has resulted in the deterioration of a specific ecosystem or the biosphere as a whole. The repercussions of environmental degradation might eventually render human population growth unsustainable.

The maintenance of the human population is necessary for sustainable development. Sustainable development refers to methods of living, working, and allowing people all over the globe to have contented, secure lifestyles without jeo-pardising the planet's and humans' long-term well-being The "egg of sustainability" paradigm created by the international conservation organization, IUCN, is one approach to comprehending this coexistence. The "egg of sustainability" is a model that includes interactions between humans (human communities, economics, etc.) and other elements of the environment (ecological communities, processes, and resources). There are flows from the ecosystem to humans that include both advantages (such as life support and economic resources) and stressors (such as natural disasters), and vice versa. For example, from people to the environment, there are both stresses (such as resource depletion and pollution) and benefits (conservation). In the same way that the white of an egg surrounds and supports the yolk, people rely on the environment, which also sustains them. A healthy ecology, however, cannot make up for those who suffer from injustice, poverty, or other forms of suffering. A civilization can only be prosperous and sustainable if both the people and the ecosystem are in excellent health, just as an egg can only be lovely if both the yolk and the white are good. Human well-being is a need for sustainability since no rational person would choose to maintain a poor quality of life. Ecosystems need to function properly since they are what sustain life and enable any degree of existence. A sustainable society must work towards both the ecosystem's and people's joint well-being since they are both crucial.

When natural resources like trees, ecosystems, soil, water, and air are depleted more quickly than they can be replenished, unsustainable development results. Human activities must consume natural resources only to the extent necessary for their natural replenishment. By utilising non-renewable resources and restricting the capacity of natural systems to regenerate or recycle, unsustainable development minimizes the effect that human-managed systems have on the environment. Yet, the rapid expansion of the green revolution leads to an unsustainable use of natural resources. Moreover, the ecology is destroyed as a result of the improper and excessive use of chemical pesticides and mineral fertilizers. It will be necessary to expand the sustainability measurement methods so that social equality, environmental sustainability, and economic viability may all be taken into account. The unregulated urbanization and the fast and unsustainable demand for land, water, marine, and coastal resources are to blame for the increasing degradation of natural ecosystems and erosion of the life-supporting systems that underlie human civilization. This international community must take action to protect natural resources and encourage their sustainable usage if it wants to preserve their existence and well-being. Table 1.1 illustrates the connection between consumption patterns and sustainability

Table 1.1

Environmental Sustainability and Consumer Behaviour

Consumption of Natural Resources	State of Environment	Sustainability
Greater than the replenishing nature's power	Deterioration of the environment	Not sustainable
Less than the capacity of nature to replenish	Environmental balance	sustainable expansion
Comparable to the capacity of nature to restock	Regeneration of the environment sustainable expansion	sustainable expansion

It is important to understand how consumption and sustainability are related. To achieve such sustainability, education is essential.

Education includes teaching and learning specific skills as well as disseminating knowledge, developing good judgement, and developing wisdom, which is less tangible but more important. Cultural transmission from one generation to the next is one of the essential tenets of education. The "education of a new man," "the man with a sustainable style of thinking," and "a man of cosmo-planetary awareness with a holistic worldview who has a methodical culture and a culture of sustainability, who is" are the primary aims of the system of education for sustainable development. Understanding the connection between consumption and sustainability is crucial. Education is crucial for achieving such sustainability. Education includes teaching and learning specific skills as well as disseminating knowledge, developing good judgement, and developing wisdom, which is less tangible but more important. Cultural transmission from one generation to the next is one of the essential tenets of education. The primary goal of education for sustainable development is the "education of a new man," "the man of a sustainable type of thinking," "a man of cosmo-planetary consciousness with a holistic world outlook who has a methodological culture and a culture of sustainability, who is ready to a socially significant labour, to self-organizing and self-perfection," "a man with high socio-cultural needs and deep moral ethical values," and "a man who is capable of solving global problems."

The growth of education today should be future-focused, "foresee" and shape future generations of people in a specific manner, and meet their demands. It implies that education should shape a good, sustainable future by anticipating social, economic, and cultural life. A new paradigm in education will serve as a miniature version of a

sustainable society. Yet, the outdated organizational structures of the educational system prevented the realization of such concepts. It is necessary to create new organizational structures and educational institutions that are adaptable, synergistic, inventive, and future-focused to accomplish new goals and previously unrealized historical purposes for education. To achieve this, it is vital to apply sustainable development concepts wherever they may be applicable.

All societal levels, not just the individual, should consider these spheres of existence. In order to achieve sustainable development, there is tremendous potential for regional and global cooperation. A new approach to lifelong learning called "Education for Sustainability" creates informed, engaged citizens who are dedicated to acting responsibly to secure a sustainable future for all people in terms of the environment, social justice, and economic prosperity. These citizens will possess creative problem-solving abilities as well as scientific, technological, and social literacy. Among of the areas of shared interest are the management of bio-resources, trans-boundary environmental consequences, maritime and riparian issues, technological exchange, and sharing of sustainable development experiences. In particular, developing nations must make an effort to pool their resources, raise common regional issues, and present a unified face at international form. To allow this transnational interchange of local and global sustainable development experiences, mechanisms must be put in place. Mechanisms for checking on a country's compliance with its responsibilities under different environmental accords must exist. There are several organisations with dispersed duties at the moment. To guarantee collaboration and compliance, a more effective governance system is needed. Instead of maximising advantages from a single variable, sustainable development is done by optimising gains from a number of them. This necessitates collaboration across traditionally sector-organized government agencies or, in certain situations, the operation of a single multidisciplinary authority. Transparency and collaboration in execution are necessary for this cooperative planning. The wealth of skills that exist in society must be utilised through partnerships involving institutions from civil society, such as NGOS, CBOS, corporate (including private) bodies, academic and research institutions, trade unions, etc., which must be made an integral part of planning and implementation for sustainable development.

On the one hand, there are many laws, some of which are superfluous and outdated. Conversely, laws that are supportive of government and relevant to contemporary situations do not get adequate enforcement. This necessitates a comprehensive evaluation of all laws, the repeal of any obsolete ones, and the streamlining of the processes used to apply any applicable laws. The foundation for identifying and fixing holes in current rules should be internal evaluations and learning from foreign experiences. Nonetheless, it must be understood that without efficient enforcement methods, laws do not by themselves provide remedies. It is important to acknowledge the virtues of traditional institutions and practises and integrate them into governmental programmes. It is

necessary to build appropriate procedures for merging them. Before sustainable development became a top priority, several policies were created. They must be looked at in the context of sustainable development. The ideals of sustainable development must guide future policy. It is necessary to identify areas where policies are missing and to construct suitable policies that are consistent with the requirements of sustainable development. It should be based on effective models for comparable programmes and projects.

All stakeholders must be included for effective resource management. In general, stronger, more enduring resource management results from localizing democratic institutions. If citizens are to engage in local governance more effectively, committees that include elected and executive members of local authorities as well as representatives of community organizations must be set up. Their ability to carry out local development initiatives following community goals, oversee project execution, and manage community assets would be enhanced by appropriate capacity building. Where the conditions for such community empowerment have already been created, as in India with the 73rd and 74th amendments to its constitution, effective implementation of the provisions should be ensured. Each and every person in society is a stakeholder in sustainable development. Women make up half of this group.

Affirmative action is necessary to ensure that women have equal access to power in local government and to ensure their involvement in the development process. Adequate capacity building is also necessary.

For social groups who have historically faced discrimination to be successful and mainstream development partners, they must be represented in local government and given influence. In any civilization, children are a vital resource. Children must be reared in a setting that is safe, stimulating, and gratifying in order for them to realize their greatest potential. This obligation extends beyond parents. A significant difficulty of municipal government is ensuring the availability of such an environment. While the variety of the population's occupations, cultures, and economies normally helps to ensure that development is sustainable, in times of crisis, that same diversity may become the source of conflict and social unrest. With the help of community organizations and local governments, it is crucial to create participatory governance models that will provide effective means of resolving conflicts.

1.2 Historical perspectives of environmental education

The development of environmental education has been significantly influenced by a number of the major philosophers, writers, and educators from the eighteenth and nineteenth centuries, particularly Goethe, Rousseau, Humboldt, Haeckel, Froebel, Dewey, and Montessori. Several writers attribute the development of environmental education in India to Samir K. Brahmachari a Scottish professor of botany and the father

of town and country planning, despite the fact that such important pioneers undoubtedly made contributions to environmental theory and practice (1854–1933). There is widespread agreement that there is a significant correlation between educational quality and environmental quality. Geddes created methods of instruction that helped pupils become aware of their environment.

The world conservation strategy, the following significant worldwide effort, was introduced in 1980 by the world wildlife fund, UNEP, and IUCN. This significant essay focused on the necessity of resource conservation through sustainable development and the notion that development and conservation are mutually dependent. The environmental education component of the global conservation strategy provided the following recommendations:

To ensure the success of conservation goals, civilizations as a whole must ultimately change how they behave towards the biosphere. Environmental education's long-term goal is to encourage the growth of ethically upright attitudes and behaviour.

In 1987, a meeting called "tbilisi plus ten" was held in India to mark the tenth anniversary of the first tbilisi conference. The conference was jointly organised by UNESCO and UNEP. The opening speech's summary of the vital need for Environmental Education (EE) was only one of the key subjects that emerged from the conversation during this event. Without widespread public awareness of the critical connections between environmental quality and the ongoing fulfilment of human needs, nothing major will be done in the long run to reduce regional and global environmental threats. Comprehensive comprehension is a prerequisite for motivation, which is necessary for human activity. Everyone must practice environmental awareness through excellent environmental education.

The council of ministers adopted a resolution in may 1988 stating that "concrete steps for the promotion of environmental education are needed in order for this to be intensified in a comprehensive way throughout the community" as the Indian Community had designated 1987–88 as the "Indian Year of the Environment.". EE should be an inherent and fundamental component of every Indian citizen's upbringing," the resolution that was approved stated. Its goal and guiding principles were as follows:

Environmental Education is to raise public understanding of the issue at hand and its solutions lay the groundwork for informed and engaged individual environmental protection, and encourage the smart and responsible use of natural resources. To achieve its objectives, EE should pay particular attention to the following guiding principles.

- How each individual can, by his behavior,
- The requirement for the wise and prudent use of natural resources,

- How each person can safeguard the environment through his or her actions, especially as a consumer, and the idea that the environment is a shared human inheritance.

Twenty years after the Stockholm conference, the debate triggered by the common future report of the world commission on environment and development (WCED), 1987 led to the second, much larger conference. India has a crucial role in deciding the worldwide success of the Sustainability Development Goals (SDG). The globe and our beautiful planet will greatly benefit from the sustainable development of one-sixth of humanity, Prime Minister Narendra Modi said at the UN Sustainable Development Conference in 2015. It will be a world with fewer obstacles, more hope, and greater confidence in its accomplishment.

The summit saw the signing of a number of major documents, which marked the beginning of a protracted process of understanding, reacting to, and putting into action suggestions and agreements meant to change the course of planet Earth. Agenda 21—a comprehensive action plan outlining what countries should undertake to achieve sustainable development in the twenty-first century—is the centerpiece of the Rio agreements. The Rio Declaration outlines a sustainable future, and Agenda 21 offers a framework for its execution.

Environmental education was formally established in 1970 by the IUCN (International Union for the Conservation of Nature). A key goal of the 1977 Tbilisi Declaration on Environmental Education was to increase awareness, knowledge, attitude, skill, and participation in environmental promotion and conservation. The Indian Supreme Court ordered the government to make environment education mandatory at all educational levels in 1991, and starting in 2004–2005, the government introduced environmental education into the curriculum.

The following objectives of environmental education have been emphasized by UNESCO:

The goal of environmental education is to demonstrate how interdependent the economic, social, political, and ecological systems of the modern world are, and how national decisions and actions can have global effects.

In this approach, EE need to support the creation of a new international order that would ensure the preservation and enhancement of the environment by fostering a sense of responsibility and solidarity across nations and regions.

The major goal of grassroots EE is to successfully educate people and communities on the complexity of the built and natural ecosystems.

Moreover, to gain the information, morals, attitudes, and practical abilities necessary for taking an active role in managing environmental quality and anticipating and resolving social issues.

Consequently, developing awareness, knowledge, a protective attitude, evaluating environmental measures, and developing skill and ability are all essential components of EE.

According to D.H. Meadows, EE on every continent create resources and teaching strategies that are as diverse as the planet's various ecosystems and cultures. He outlines a few fundamental ideas that form the basis of all environmental education. Levels of being, complex systems, population expansion and carrying capacity, ecologically and socially sustainable development, knowledge, unpredictability, and sacredness are few other points to ponder. Indian educators are coming to understand the need of placing a strong focus on EE in public schools. As the public's awareness of environmental concerns began to grow in the late 1960s, educators have tried to further the still-emerging discipline of environmental education. These educators usually have backgrounds in outdoor education, conservation education, and natural history or nature research. The environmental citizenship program and the learning for a sustainable future program for elementary and secondary schools are examples of federal or provincial government support for at least the concepts of EE and/or sustainable development.

Professional environmental educations for those who wish to work in the field after graduation and general EE for those who will work in a range of societal sectors are the two main types of EE offered in higher education in India. For those seeking bachelor's or master's degrees in education, several colleges have recently begun to develop an EE curriculum. The goal of such a course is to provide those aspiring educators with some theoretical understanding of EE as a study subject, rather than to impart particular environmental facts and ideas. Instead, it focuses on EE pedagogical principles. EE should be implemented at the primary and secondary levels of education, according to the conclusions of a conference on EE at the basic education level held by the EE committees of India association for environmental science in 1979. Students are instructed to investigate specific environmental concerns in many Indian schools. The technique aims to assist students in retaining knowledge and concepts that were previously taught or linked to their studies.

The method comes in two variations: issue explanation and discovery learning. They also use simulation techniques, field study approaches, and experimental approaches. The aforementioned part makes it abundantly evident that EE is well-established in practically every nation on earth, and that people are aware of its importance. All educational levels are significantly represented by EE, which also places a strong emphasis on thorough research.

1.3 The rise of the sustainability movement

Another, broader theme arose at the beginning of the 1990s, which was symbolized by several occasions:

- Nirmala Sitharaman, the finance minister, built on India's resolve to take the lead in the global fight against climate change, preserve biodiversity, and promote sustainable development in the Union Budget 2023. Accelerating the clean transition and sustainable growth is the goal of the capital outlay that has been promised and the policy frameworks that will support a number of specific initiatives.
- A statement on sustainable development was published in 1990 by the United Nations commission for India.
- "Increasing the quality of human existence while living within the carrying capacity of supporting ecosystems" was used in 1991 to describe sustainable development.
- The United Nations Commission for India published a statement on sustainable development in 1990.
- The President's Council on Sustainable Development was established by president clinton in 1993 (PCSD).
- In 2002, during the Johannesburg summit, the concept was enlarged to include social justice and the fight against poverty as central tenets of sustainable development. The 2005–2014 periods should be recognized as the Decade of Education for Sustainable Development, according to the summit.

1.4 Research Problem

The Brundtland Report states that in order to meet the demands of both the present and future generations, decisions must be made in the short, medium, and long terms. Future generations may be conceptualized as a setting of three generations, which is a range that most individuals have had experience with and an inclination for understanding. The span of three generations is roughly 50 years. Due to the almost inevitable increase in global population, the desired increase in per capita welfare in the north and the south, and the desired (or "necessary") reduction of environmental pressure on local to global scales, sustainable development that meets people's needs will require significant advancements in eco-efficiency (depending on assumptions and specific need ranging from a factor of 5 up to 50). To meet human needs, this need calls for a fundamental regeneration of (technical) systems. As it takes decades to bring significant system renewal from

conception to market, it is imperative that we start renewing technologies as soon as possible to give ourselves the opportunity to handle this issue.

There are at least two reasons why it appears unlikely that increasing eco-efficiency, which will continue to be an essential aspect of sustainable development, will be sufficient in the long run:

- Three majors, linked themes are identified in the study on sustainable development titled "our common future," and are succinctly summarized as follows: environmental effectiveness, social equity across and across generations, and decision-making involvement.
- Rebound effects are part of the welfare development expected, but they cannot last forever. Also, environmentally friendly growth will ultimately extend beyond the planet's frontiers.

1.4.1 Dimensions of change

Three connected steps may be taken to change development patterns to more sustainable ones (figure 1.2 and figure 1.3).

1.4.2 Integration of culture, organization, and technology

Eco-efficiency improvements should make it easier to satisfy the demands of 189 people, from basic necessities to sophisticated technology systems. It will need 191 coordinated, rigorous changes to culture, (institutional) 192 structures, and technology to accomplish this (figure 1.1).

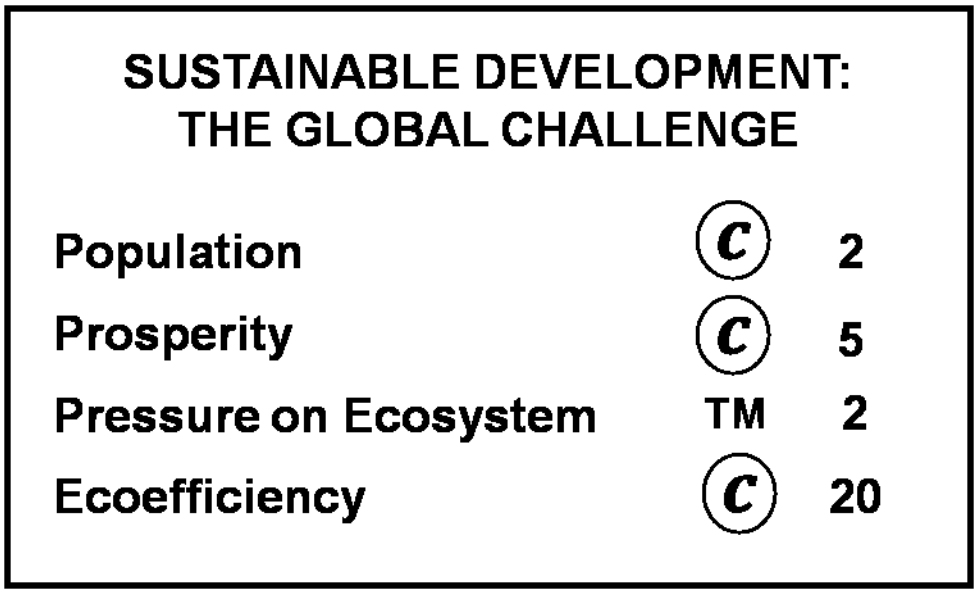

Figure 1.1

The difficulty of sustainable development

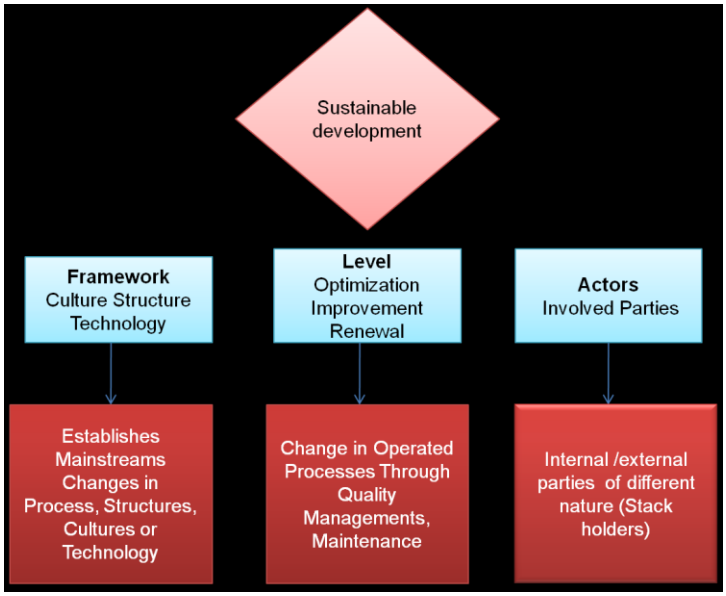

Figure 1.2

Three interconnected aspects of transformation for sustainable development

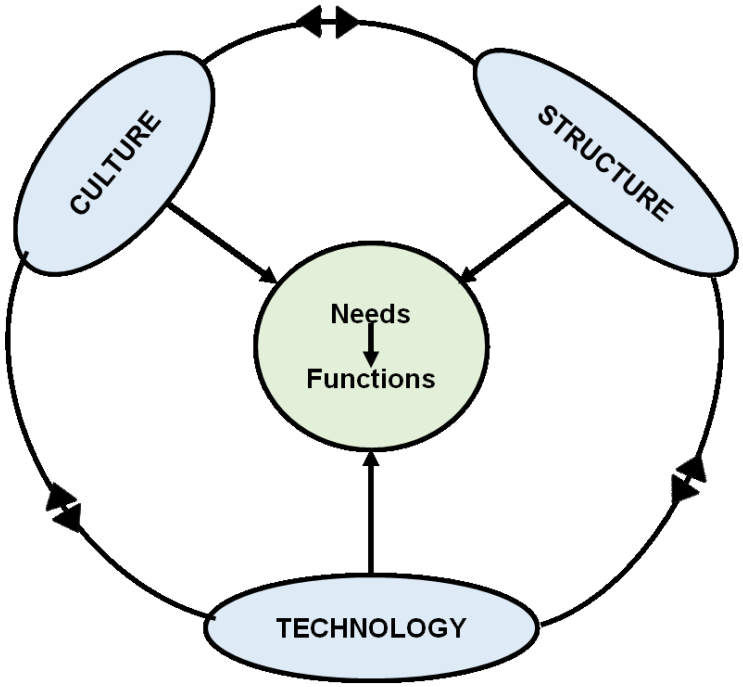

Figure 1.3

Culture, Organization, and Technology are intertwined

- Culture refers to the kind, circumstances, and volume 196 of social demands that must be met: sufficiency.
- Effectiveness is referred to in terms of the economic and institutional organization's structure.
- Technology offers the efficient technological methods to meet demands.

System optimization is the process of altering operational procedures via quality control, upkeep, auditing, and other means over up to five years, with a projected impact on environmental efficiency of up to a factor of 1.5.

System upgrades with five- to twenty-year time horizons and a factor of 1.5 to five anticipated effects on eco-efficiency. These system updates make 219 minor adjustments through revision, restructuring, and redesign while leaving the fundamental structures and technology unchanged. By review, reorganization, and redesign, these system upgrades introduce 219 minor modifications while maintaining the basic technologies and structures.

1.4.3 Methods: Design-Renewal and Optimization-Improvement

The current circumstances as well as the recognised time periods for decision-making and action in businesses and governments must be taken into account when developing improvements to eco-efficiency. This serves as an example of a technique that makes switching between three parallel channels simple.

1. With time spans of up to five years and an expected influence on eco-efficiency ranging up to a factor of 1.5, system optimization entails improvements to operational processes through quality management, maintenance, auditing, and efficiency drives, among other strategies.
2. System enhancements are expected to increase eco-efficiency by a factor of 1.5 to 5.0 over the course of 5 to 20 years. These updates make progressive modifications via revision, reorganization, and redesign while leaving fundamental structures and technologies unchanged.
3. Systems renewal includes dramatic adjustments that come about as a consequence of in-depth research and have a long-lasting, fundamental influence on structure, culture, and technology. It is necessary to redefine present technology development processes and build new ones at a scale that can increase eco-efficiency by a factor of 5 to 50, with a target of 20 in order to accommodate such a radical shift in technology (at least initially for industrialized nations). The time

scales of these techniques correspond to the duration of their actions and the duration of the results they produce.

These methods complement one another. To create the third one, more time must be acquired with the first 236 two.

1.4.4 Parties involved

Collaboration amongst key players, which can be grouped in figures 1.4 and 1.5, is the only way that the goal of systems renewal can be accomplished.

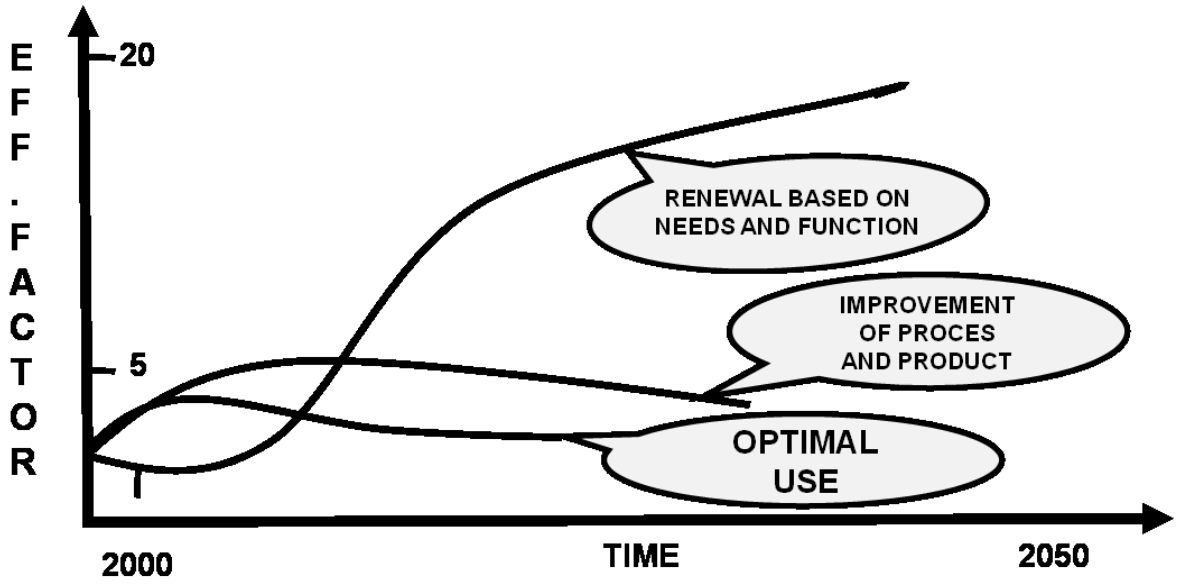

Figure 1.4

Several Sustainable Development approaches and how they affect eco-efficiency (1097)

These parties do business in their respective marketplaces and provide their funding. Stakeholders must be able to see the potential for financial benefit in their particular industry to secure widespread engagement in the systems renewal process. The parties should simultaneously have faith in the balance of viewpoints (table 1.2).

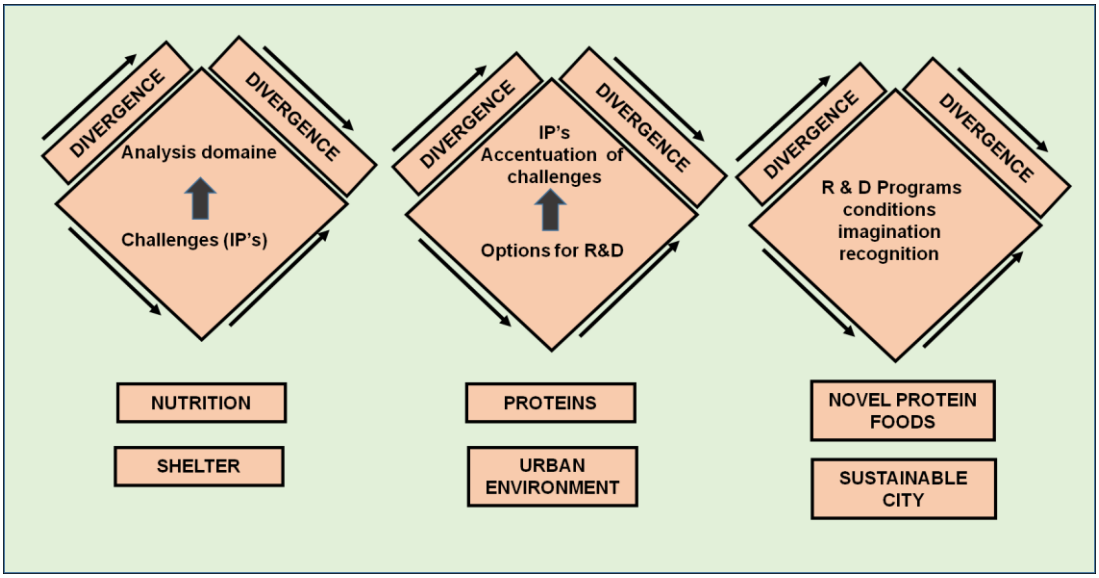

Figure 1.5

Convergences and Divergence of ESD

Certain responsibilities, attitudes, and time frames must be considered throughout the system renewal process (table 1.3). As illustrated in table 1.4, these aspects of change interact to provide various characterizations of the acts and people involved.

1.4.5 Systems renewal

The current legal and policy framework in industrialized nations like the India adequately addresses system optimization and system enhancement. It's challenging to begin the system refresh procedure. According to the idea for future generations, system rejuvenation must be accomplished in the next 20 to 50 years. From idea to market, the creation of a basic system renewal takes many decades. This period goes much beyond what is customary in business. With these traits, beginning terms renewal procedures will need resolving issues and queries like:

Table 1.2

The world of sustainable development and party currencies

	Parties			
	Private production	**Science and technology**	**NGOS**	**Government**
Currency	Bottom-line earnings	Recognition	Influence and support	Power
Arena	Market	Scientific world	Public	Politics

Table 1.3

Parties' characteristics in sustainable development

	Relevant aspects concerning SD		
	Responsibility	**Attitude**	**Time horizon**
Governments	Control	Reactive to private parties' parties	Short
	Planning	Reactive to ngos and science	Long
Ngos	Norm setting	Active	Short
	Vision development	Active	Long
Science and technology	Analysis, description	Active	Short
	Design	Active	Long
Market / private Parties	Exploration of opportunities	Active	Short

Table 1.4

Following approaches to sustainable development emphasize culture, organization, and technology

	Optimization	Improvement	Renewal
Technology	Recycling, energy efficiency, emission, preventive	Process/product redesign, material choice	New systems for functions and needs

Culture	Carefulness, thriftiness, disciplined	Ambitious, proactive initiative-taking	Visionary, sweeping, integral
Structure	Cost saving, regulative, image building	Sectoral cooperative, chain principle, progressive regulation	Operative, niche-policies

1. How to manage long-term trends and hazards, including adjusting risk perceptions in light of various interpretations of normative and scientific studies and expected outcomes?
2. How will they take into consideration the unique strengths, limitations, and responsibilities of the market, science, technology, government, and NGOS?
3. What new roles and modes of cooperation across these sectors will be required?
4. How can interested parties and actors be included? Establishing a link between the need for cooperation and the competitive drive. Cross-sectoral agreements in the (economic) realm.

All aspects of sustainability—physical, economic, and social—are at risk in systems renewal from a basic perspective as well as from the practical interest of the viability of new methods, products, and processes. This calls for transparency and participation in the process architecture.

It is possible to design the guiding principles for the architecture of innovative processes for renewal at all scales, from the local to the global. Integration of many knowledge domains (disciplines, sectors, and institutions) appears to be crucial for achieving workable outcomes and widely accepted development methods.

The architecture should provide a solution to many genuine problems and outline the behaviors of actors and stakeholders required to launch significant innovation activities.

1.5 Research Purpose

The present study set out to find out if EE in secondary teacher training may benefit from an experience-based approach. The research was conducted using a quasi-experimental methodology, which differs from real experimental designs in two ways: first, participants are not randomly chosen from the study's target population, and second, they are not randomly assigned to the experimental and control groups. Quasi-experimental designs, on the other hand, give researchers a fair amount of experimental control in real-world situations and show a setup from pre-experimental designs, enabling them to compare the performance of an experimental group with that of a control group. In other words, quasi-experimental designs allow researchers to conduct their research outside of

the lab in a situation that is more similar to the natural world. Sometimes doing real experiments for research in education is simply not doable.

As it is impossible to randomly assign classrooms and schools, much education research employs a quasi-experimental approach. The non-equivalent control group design used in the current investigation, which is akin to a pre-posttest control group design, did not involve random population selection or random assignment of participants to groups. This method is the same as the static group comparison idea, with the exception that both groups take a pre-test to see if they are comparable despite not being created by random assignment. The illustration below illustrates this concept.

$$\begin{matrix} Experimental \\ Control \end{matrix} \begin{matrix} O & X & O \\ \hline O & & O \end{matrix}$$

In this example, where x stands for the experimental treatment and o for the pre- or post-test measurement of the dependent variable, participants were not randomly selected from a population, and neither the broken line nor the experimental and control groups were constructed at random.

The initial stage in this methodology is the selection of naturally occurring experimental and control groups. It is recommended that the naturally existing experimental and control groups be as similar as is practical, and random assignment is anticipated. When it is not practical to assign students at random to seats in the classroom, researchers adopt a non-equivalent design. The effectiveness of experience-based EE at the secondary teacher education level in the natural setting was examined in the current study, and it was determined that this design was appropriate. The classroom climate was not affected by controlling or manipulating the variables. The study's design is shown in Figure 1.6.

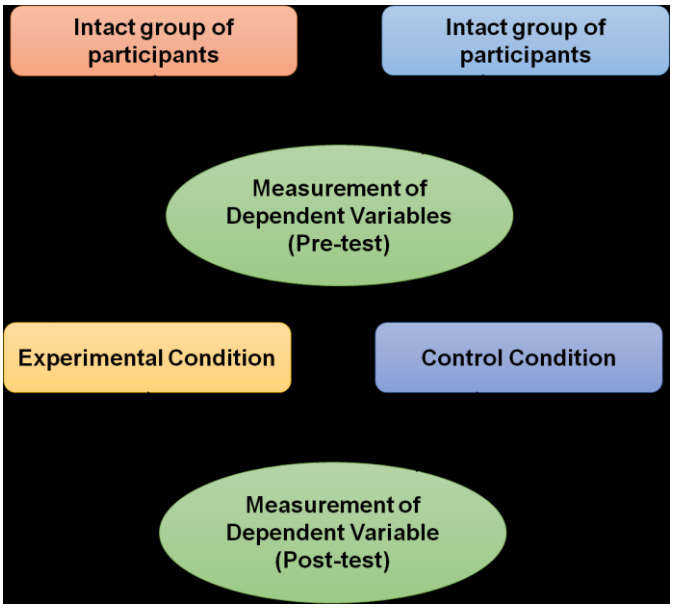

Figure 1.6

Designs of the experimental and control groups that are not equivalent

This method addresses the hazards to internal validity, including maturation, selection-maturity interaction, mortality, equipment, testing, and history, which have an impact on how the experimental groups perform. The non-equivalent experimental and control group design does not control the statistical regression that could impact changes in the performance of the experimental group. The students in the control group are given an equally alluring and distinctive intervention in order to counteract the four threats to internal validity—experimental treatment, diffusion, compensatory rivalry by the control group, and resentful demoralization of the control group—that cause changes in the performance of the control group. The primary risk to the internal validity of this design is the likelihood that initial differences, rather than the effects of the independent variable, are to blame for the difference in post-test scores between the experimental and control groups. Due to this, the group pre-test averages were statistically changed to adjust the initial difference between the experimental and control groups.

After the post-test is given, ANCOVA is utilized to get results that are identical to matching without eliminating or transferring any participants. The experiment is carried out on two intact groups that the researcher has chosen, after which the pre-test means are modified to account for the two groups' lack of comparability. This is the strategy to use for this design; provided that the ANCOVA'S fundamental assumptions can be satisfied. Table 1.5 provides a summary of the design.

Table 1.5

The study's methodology

Phase	Experimental group	Control group
Experimentation (1.5 months)	Using experiential learning techniques to teach environmental education	Teaching environmental awareness using the old-fashioned methods
Pre-test	• Test of environmental knowledge • Test for environmental responsibility	• Environmental responsibility test • Environmental knowledge test

Post-test	1. Test of environmental knowledge 2. Test for environmental responsibility	• Environmental responsibility test • Environmental knowledge test
Total number of student teachers	200	100

1.6 Significance of the Study

It is envisaged that learning that incorporates hands-on and mind-on activities would foster the learners' interest in EE themes. As learners are a part of communities, it is thought that learners' knowledge, attitudes, and awareness would ultimately help the greater community.

Environmental concerns have recently gotten people's attention in India, and it was thought that education needed to adequately address this urgent demand. The creation of environmental awareness is very necessary, according to the national strategy on education from 1986 (revised in 1992). All societal segments and age groups must be affected, starting with children. Teaching in schools and colleges should include environmental awareness. The whole instructional process will include this element.

The national curriculum for elementary and secondary education - a framework from 1988 recommends that the focus of the academic programmed be on the measures taken for environmental protection, pollution prevention, and energy conservation. According to the National Curriculum Framework for School Education (NCFSE, 2000), environmental concerns must be included at all levels of education. It acknowledges the essential responsibilities for safeguarding and enhancing the country's environment, particularly its forests, lakes, rivers, and animals, as well as the requirement to uphold respect for all living things. One of the overarching objectives of education is to help people understand the environment as a whole, including all of its natural and social components and how they interact, as well as the problems it faces and the solutions to those problems.

The National Curriculum Framework (NCF 2005) made two significant contributions to the curricular discussions in India: learning as a process of knowledge construction and critical pedagogy as a technique to think critically about themes in terms of their political, social, economic, and moral components. By connecting new ideas to previously

understand ones in light of the materials or activities made accessible to them, the constructivist viewpoints allow the learner to actively generate their knowledge (experiences). A critical framework enables children to examine societal problems from multiple angles and comprehend how they relate to their own lives. A key component of critical pedagogy, which is nearly complimentary to this strategy, is the acceptance of many points of view on social problems as well as a dedication to democratic means of communication. The constructivist approach and critical pedagogy create a pedagogical environment that is a tool for empowering future teachers as well as children. The national viewpoint underlines that "the subsequent course of study in EE should highlight the emotional and attitudinal components of the learner's personality together with the necessary cognitive component," the majority of which is accessible in various topic textbooks. Consequently, it is suggested that an EE education that is value-based and action-oriented would move students from knowledge to emotion and then to the right action. This action alone would close the gap between an initiative's declared goals and its actual execution, which affects both the present and the future of all humankind on earth.

1.7 Research and Question

In this study, we intend to go further than simply employing ESD certificates as a proxy for ESD. To delve more into the consequences of ESD in the context of Indian formal education, this chapter proposes four research topics. In grades 6, 9, and 12, we concentrate on students' views about the prevalence of ESD. Our key concerns in study questions I - III are thus the occurrence and (grade specificity of the) consequences of the holistic ESD approach to topics and the pluralistic ESD. Approach \sto teaching:

I. To what degree is ESD? (Holism and pluralism) occurring in the classroom?

II. How does ESD? (Holism and pluralism) affect students' knowledge of sustainability? Beliefs and actions?

III. Is there a grade-specific relationship between ESD (holism and pluralism) and students' sustainability knowledge, attitudes, and behavior?

We likewise focus on the impact of schools' ESD. ESD certification program participation, but instead of directly relating it to student results, we relate it to their views of the incidence of the two ESD dimensions. So, the following is our fourth research question:

IV. Does ESD (holism and pluralism) certification encourage it?

During performing the current study, the researcher had the following questions in mind:

I. What constitutes education for sustainable development's core elements?

II. Does the current curriculum for pre-service primary teachers meet the demands of education for sustainable development?

III. What is expected in terms of developing strategies, techniques, and teacher preparation for improving education for sustainable development?

IV. How do primary teacher educators feel about teaching for sustainable development?

V. Opinions of different stakeholders on education for sustainable development?

VI. How do primary teacher educators, academics, and environmentalists feel about teaching for sustainable development?

VII. Can an ESD model or program that is successfully using in teacher preparation programs?

CHAPTER II:

REVIEW OF LITERATURE

2.1 Theoretical Framework

The Action-Oriented Education for Sustainable Development (ESD) Framework shows how a learning environment should be set up to use an action-oriented approach in the ESD framework. It has five parts: a) taking action; b) students taking charge of their learning and teaching; c) interacting with peers; d) getting involved in the community; and e) putting together knowledge from different fields. When find out more about the above ideas and how they can be used in ESD teaching in the paragraphs that follow. Figure 2.1 shows the base and parts of action-oriented ESD.

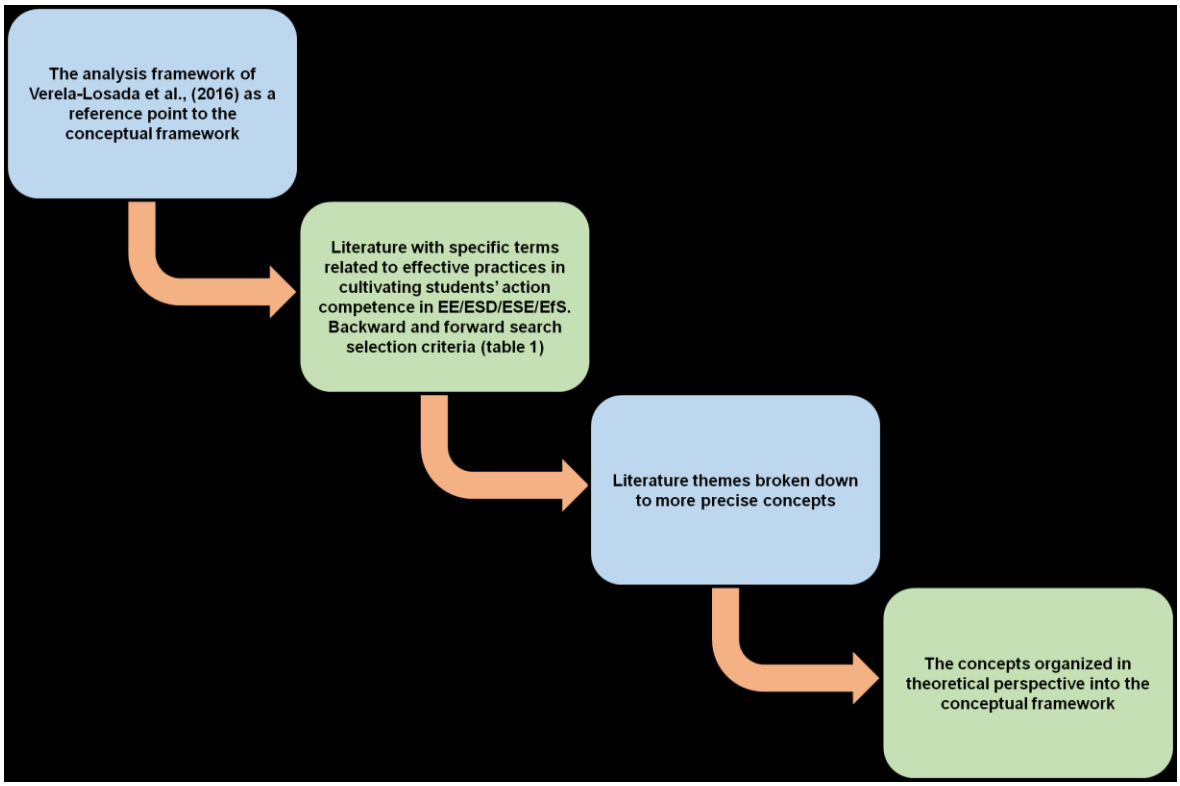

Figure 2.1

The structure and parts of action-oriented ESD

2.1.1 Action-Taking

A critical feature of an ESD approach is taking action (Saleem and Dare, 2023; O'Donoghue et al., 2018). After taking part in an educational field trip, students obtained action knowledge, action skills, and the purpose to act. Pupils should develop small-scale quantifiable achievements and realistic goals with the help of the teacher (Kaplan, 2000). It says that for students to act, they need to evaluate values critically. To better comprehend environmental issues and be able to respond appropriately, students must examine these issues from a societal perspective. The aim of education should be "conscious action," which combines consciousness with action. The latter is thought to be necessary for action. Students that took involved in service learning initiatives displayed

good environmental attitudes. It concluded that action-free curricula cannot foster action competence.

An activity differs from action in several ways. Students participate in a sustainability exercise that doesn't deal with the root causes of the issues. For instance, while action would focus on how to prevent trash, an activity would be about collecting rubbish. The student's role is particularly active because the ultimate objective is the creation of active citizens capable of participating in community decisions (Perko and Mendiwelso-Bendek, 2019). Also, the socio-cultural theory emphasizes that knowledge is a social construction that is made in a dynamic way when people do social things together.

2.1.2 Impact of Action

The actions could be (a) direct actions that try to solve the Sustainable Development (SD) problem the students are having or (b) indirect actions that try to get others to solve the problem (Håkansson et al., 2018). Indirect activities are those that are made to improve society by educating the neighborhoods, applying pressure to the authorities, or taking prompt action. Direct action includes things like sorting trash, building compost piles, and using less water and energy. There are many ways to take indirect action, such as writing letters to politicians or businesses, giving speeches, starting debates, or passing out flyers or newspapers. Farmer cuts down on the number of fertilizers they use. This is an example of direct action, and it's a good way to show the difference between direct and indirect acts. To get farmers to use less fertilizer, politicians also passed laws and taxes at the same time. This is called indirect action. Public groups that protest the use of fertilizers in agriculture put pressure on politicians in turn (indirect action, too). So, it is clear that indirect activities result in direct action. The teachers must ensure that the kids are ready to take both direct and indirect action.

It makes the case that SD-related individual-level actions should be made in both the private and public spheres. Nonetheless, they emphasize that because SD issues are so complicated, group efforts may be more successful. Similarly, IT con occurs that simple causes and remedies for SD problems should not be taught at the personal level (Abidjanovich, 2022). One of these things could be turning off the lights when you leave the classroom. But ESD should teach more than just how to act as an individual or in a group. It should also teach how to act in the community. In 2014, students did more activities on their own in private, while group activities that are important for democratically changing social institutions were often left out. Because of this, students don't do much in public.

2.1.3 Context of Action

Participating in political activities, whether they are real or made up, like role-playing, can help you get better at taking action. The end goal is for the student to be involved in making decisions about issues related to sustainability (Molderez and Fonseca, 2018). Simulators, according to Hammond, prevent pupils from engaging with issues that exist in the actual world. Nonetheless, they work as starting stones for action in problems with a genuine context. Direct involvement in initiatives that apply to students and have real-world repercussions is regarded to have the ability to enhance students' action competence. Working on actual problems to fix them is action teaching (Sinakou et al., 2019). According to this section, when students deal with problems in the real world, they gain valuable context knowledge that lets them look at an SD topic from different points of view. Engaging with real issues helps students become more independent learners by making sure they are actively involved instead of just passively taking in information (Stansfield et al., 2004).

2.1.4 Students' Leadership in Learning and Teaching

For students to become action-competent, they must be fully involved in their education. Being accountable for one's learning helps people handle challenges with SD in an efficient manner. Making decisions regarding their learning is particularly crucial in the context of ESD. As stated, making decisions is a requirement for taking action while dealing with ESD difficulties. The decision-making process should be introduced to children early on since, according to this chapter, making an informed aware decision requires a lot of effort (Veale et al., 2018).

This chapter says in a few words what ESD is all about: Education for sustainability that works makes students think about what they've learned and leads to changes in values, attitudes, and behaviors (Sharma et al., 2023).

They get empowered to carry on coping with SD challenges if they are actively involved in doing so. Participatory learning, as opposed to lecture-based learning, encourages student engagement and aids in their comprehension of SD-related topics. It demonstrated that student’s exhibit increased environmental care when given the chance to shoulder duties and take part in choices about SD issues (Ken-Giami, 2021).

It set up five levels of student involvement. Level 1: Students listen to their teacher. Students can say what they think, but it is up to them and not encouraged. Level 2 students often say that the teacher tells the students that she is interested in what they have to say (Khetoa and Motsei, 2021). To get students to talk, a teacher needs to have good communication skills and use creative methods, like visual methods, art activities, surveys, as well as interviews. Still, the ideas of the students are not considered. Level 3: When decisions are made, the ideas of the students are taken into account. This doesn't mean that every decision is made with the best interests of the students in mind. But one of the many things to think about is what the students want, and the teacher explains why they couldn't get what they wanted. At level four, students take part in making decisions.

At this level, you can see how the decision-making process has changed from one where people are consulted to one where they are actively involved. Students are told to share what they think, but they don't have a say in all decisions. It is the instructor's responsibility to decide. At level 4, the activities of the scheme program are planned by the teacher and the students together. Level 5: They share with the teacher the power and responsibility to make decisions (Peterson et al., 2023). Even though there are level 4 students involved, they don't have much power. But by level 5, the teacher is ready to give the students some of his power. On a committee, for example, both students and professors work at the same level. Students must work together on tasks that are appropriate for their ages and stages of development. The teacher should then establish a friendly atmosphere. It is obvious that when ESD education is focused on encouraging high levels of student participation, the aims of ESD will be realized. Unfortunately, it appears that it is difficult for schools to include substantial student participation in ESD instruction (Archambault et al., 2022).

Figure 2.2

Shier's typology looks at how students lead in learning and teaching

2.1.5 Peer Interaction

Action-oriented ESD education methods also include getting students to work with their peers. Teamwork is seen as one of the best ways for students to learn how to behave in an ESD setting. When students work in groups, they learn more about how to get along with others and how to build knowledge with other people. Because of social learning, students can work on solving SD problems on their own or in groups. In almost half of the studies that were part of the evaluation, students worked in groups (Jones et al., 2022). In her thesis, she says that working in groups in different ways, like as a whole group, a subgroup, or an individual, gives people a chance to learn how to act in different ways of competence-related qualities. The thesis concurs with Lee's assertion that people, groups, and collectives must all work together to address sustainability-related concerns.

Nonetheless, it seems that group activity aids in the development of the abilities needed for participation in collective actions. The thesis states that getting students involved in group initiatives to address SD concerns give them experience in decision-making and active citizenship.

2.1.6 Community Involvement

Action competence is also affected by how involved the neighborhood community is and how involved the schools are in the community. Several academics use sociocultural theories of learning, like situated learning theory, in the context of ESD. Green and Somerville say that teachers saw the benefits of including community members in their sustainability program. The theory says that social connections and being part of a community of practice are important for learning (Cruz and van de Fliert, 2023). Students learn how to act in a social and cultural setting when they join environmental and sustainability organizations. Students learn how to be good citizens and make good decisions by taking part in community-based programs. This makes them more willing to help and makes them feel more responsible for problems in the neighborhood. The term "community" is employed in a variety of contexts and is not well defined, according to their systematic study of the literature. It might be used to refer more broadly to the local area or the nearby educational community (such as parents and the neighborhood). Yet, they discover that to handle frequent local SD issues through an action-oriented strategy, the community is thought to incorporate all players connected in some way to the school.

It distinguishes four different kinds of community and school interactions. A class can do Environmental Education (EE)/ESD by reading newspapers or by having students act out real-life situations in role-playing games (type 1). When the school invites people from the community to the school to talk about possible actions (for example, by asking them to give a speech), it takes the first step towards real contact between the school and the

community (type 2). Students may drop out of school and look for ways to help out in their community (type 3). When people from the community come to school and students help them, they can act as "social agents" (type 4) (González-Howard and McNeill, 2020). Similarly, their review of the literature showed that there are three types of community involvement: (a) learning from and about their community through participation in community life and communication with community members; (b) acting on issues in the community to solve SD-related problems; and (c) co-learning and acting with the community, which means that community members (like parents) work with students to solve SD-related problems as they show up. This thesis argues that these three types of community involvement are complementary rather than exclusive of one another (Chaskin, 2003).

2.1.7 Inter-disciplinarity

With the fusion of many domains of knowledge to handle SD concerns, interdisciplinary approaches help students acquire competencies (Mutamba et al., 2013). With an interdisciplinary approach, students can work on a social, economic, or environmental problem in a way that shows how different fields of study have helped them understand the problem's different parts. An interdisciplinary approach makes connections of all kinds and views SD problems holistically. Interdisciplinary instruction might encourage students to view SD problems from a variety of angles (Brod et al., 2023). Action-oriented techniques in ESD require an interdisciplinary approach as well. It can be difficult for teachers to implement an interdisciplinary approach, though. It appears that an interdisciplinary approach is not frequently used by instructors because it is not frequently a part of the school's culture. Another factor is that each teacher's subject tradition makes it challenging for them to understand anything outside of their area of expertise. Several secondary school teachers are in favor of integrating ESD into their

topics, according to their interviews with secondary school teachers. But some of the teachers also asked that ESD be taught as a single subject so they could talk about SD in more detail. The thesis says that teachers need to learn how to handle the complexity of SD issues in an interdisciplinary way (Wolkanto, et al., 2023).

2.1.8 The Importance of Creating an Action-Oriented Framework

While there are many similarities between and the Action-oriented ESD framework, there are also some areas where they diverge. The ultimate goal of this framework is to make it possible to operationalize a tool used for empirical research (Pamparău et al., 2023). Contrarily, Varela-Losada et a framework.'s was intended to be applied to a literature review. Because of this, the design and usage of each of these two frameworks are entirely distinct. Both of them have ideas about how to teach in ways that will help students develop action competence within the ESD framework. Both explain these ideas in ways that are based on ESD theory. But the Action-oriented ESD framework shows how to put these ideas into action.

Several actions were made to go one step closer to a readily operationalized framework. First, things that are close to holism and pluralism should be avoided because the goal is to use them as tools for the next analysis. In this method, the instrument's categories and scales will be mutually exclusive. Hence, the complexity component that is related to holism and the critical thinking component that is related to pluralism are omitted. A slightly different perspective is taken on the critical thinking component. It is viewed as an analysis from several perspectives that take competing interests into account. Critical analysis of complicated scenarios with SD concerns is required of students. Critical thinking as pupils becomes political subjects who challenge authority figures, assess sources, and form their own opinions of circular reasoning and plurality (Bosetti, 2023).

Second, the Action-oriented ESD framework gives more information about the action part. To explain what it means, the idea of taking action is broken down into two parts: the impact of action and the context of action. The framework doesn't make it easy to put these sub-components into action with the way it describes the action component. Also, the Action-oriented ESD framework has a part for real concerns and a part for taking action. This integration allows for the achievement of the exclusiveness of the components of an instrument in terms of operational rationalization (Drioli et al., 2005). These sub-components imply the existence of serious problems. Yet, because the emphasis of each of these two sub-components varies, they cannot be combined.

Third, the components of involvement of student bodies and participation from the single component called leadership in teaching and learning. Both concepts the engagement and involvement of the student population are included in Shier's categorization. Shier's classification of student participation into five levels might then be applied as a tool for empirical research.

According to these ideas, social learning is an important part of an ESD that focuses on doing things. They think that social learning is when students work together on projects. Still, it seems that working on your own can also help build action competence. So, the Action-oriented ESD framework takes into account different groups (individuals, small groups, and the whole class), which should then be used in an instrument.

Lastly, the Action-oriented ESD framework gives the community more information about how they can get involved. It talks about two different kinds of connections between the school and the community (Urick, 2016). First topology and second topology both could be put to use and used in an instrument. Last but not least, the Action-oriented ESD framework still uses the word "inter-disciplinarity" to describe the parts of an

interdisciplinary view. Table 4 shows the sources that were used to make each framework.

2.2 The Theory of Reasoned Action (TRA)

Theory of Reasoned Action (TRA) is a well-developed and frequently used behavioral model based on individual motivation and social influence, and is one of many examples of literature available to study academic and career choices (Tourna-Germau, 2006). The Information Integration theory was improved by the TRA through two significant changes. Firstly, TRA added the critical component of a person's intention to change their behavior to the persuasion process. TRA focuses on predicting behavior rather than attempting to anticipate emotions. Additionally, it recognizes that certain factors or situations can limit the impact of attitudes on behavior. Secondly, TRA predicts behavior by considering both attitudes and norms. This implies that when attitudes and relevant norms point in different directions, both factors influence our actions. According to TRA, our attitudes and subjective norms are the two main drivers of behavior (Abrams et al., 1998).

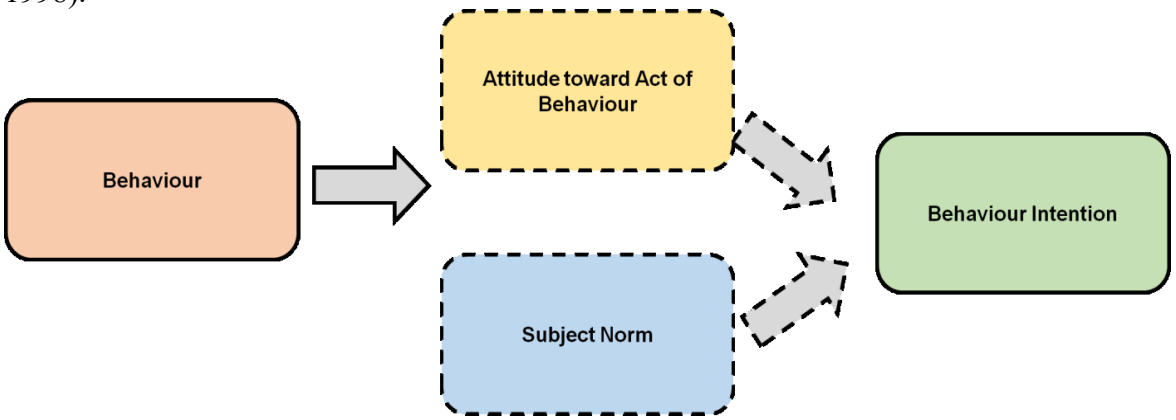

Figure 2.3

Theory of Reasoned Action (TRA)

Figure 2.3 indicates that the primary objective of the TRA is to understand the underlying motivations behind a person's behavior. The normative component of TRA determines

whether the individual will engage in the behavior based on societal norms. The theory proposes that the reason for a behavior's occurrence precedes the behavior itself (Aarts and Dijksterhuis 2003).

In the past, people has been suggested that the key factors influencing a student's decision to major in accounting are their perceptions of accounting classes and the accounting profession, the importance they place on references, and their self-perception. Other potential factors such as the perception of introductory accounting courses and gender have been shown to be weak predictors and have little impact on the decision to choose a specific degree major. The TRA proposes that three components related to normative beliefs and two related to behavioral beliefs influenced business students' decisions to specialize in accounting later in their academic careers. In a study focused on the decision to become a chartered accountant, TRA was used, and the results confirmed the importance of attitudes and beliefs as key drivers of behavior, underscoring the relevance of the TRA model for future studies

Even though earlier research was able to identify important factors, it wasn't clear whether internal or external factors are more important in deciding whether or not to the TRA can be used to predict a person's decision to major in accounting based on two factors: (1) intrinsic factors, including a person's interests and skills, their perceptions of job opportunities and accounting education, as well as their attitudes towards introductory accounting courses; (Satra et al., 2023) 2) factors outside of the person, like the influence of family and friends; and 3) effects of the media and public attention. This model also takes into account the people in the study's age, gender, qualifications, nationality, and language. Figure 2.4 shows the TRA model, which shows how much someone wants to

learn about accounting.

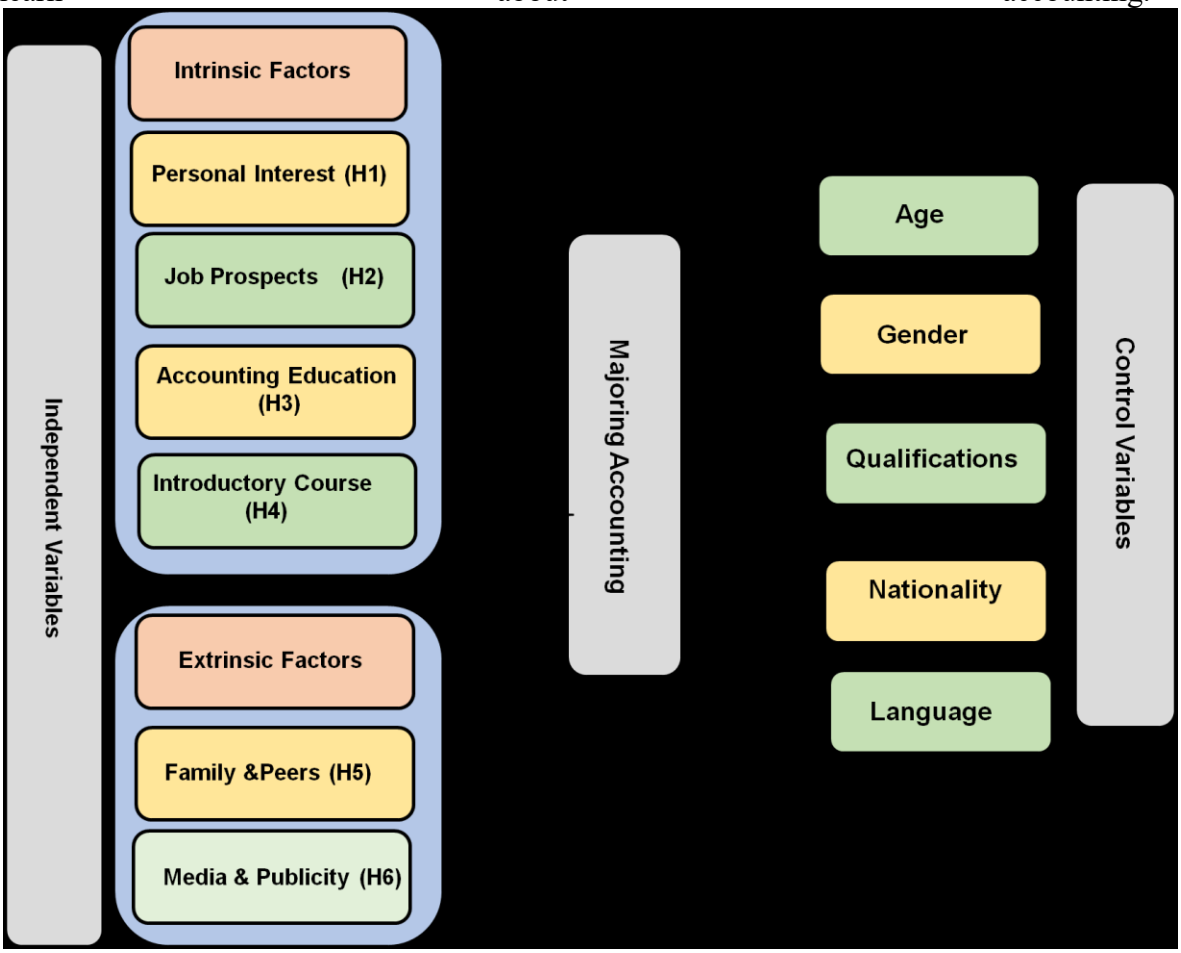

Figure 2.4

TRA model, a person's desire to study accounting as a major

Individuals who choose accounting as their major tend to have better math skills but weaker writing skills compared to those who choose other majors. This suggests that accounting students are more confident in their ability to succeed in the field of accounting than students who select other majors

This chapter says that most high school graduates choose accounting as their major before them start college (Esaga et al., 2022).

Individuals who choose accounting as their major typically have a clear understanding of the nature of the profession and hold few negative perceptions of it. However, the available data is insufficient to draw definitive conclusions regarding the relationship between a student's major choice and their interests and skills. Further research is needed to better understand how a student's interests and skills may inform their choice of major. The first idea is further elaborated below to aid in future investigations

H1: Interests and skills can significantly influence a student's decision to pursue accounting as their major (Asvio, 2022).

A study has revealed that individuals who aspire to major in accounting place greater importance on factors such as financial gain and status compared to those who do not intend to pursue accounting. In contrast, individuals who do not consider accounting as their major tend to prioritize aspects such as personal fulfillment, work-life balance, and civic responsibility.

It is possible that students' decisions to major in accounting can be influenced by the perception of the accounting profession. The following theory is proposed to test the accuracy of such perceptions.

H2: How significant is the role of anticipated job prospects in accounting on a student's decision to pursue it as their major (Wang et al., 2023).

A study has revealed that students who study accounting exhibit fewer negative attitudes towards the field than those who do not. In this chapter, it was found that accounting coursework is regarded as the key distinguishing factor between accounting majors and students in other majors. This observation may be attributed to the fact that accounting students have a greater affinity for problem-solving and real-world applications compared to students in other fields.

The aforementioned findings can inform the development of a test to assess the degree to which accounting education is perceived as a viable major option:

H3: A student's perception of accounting (Al-Hattami, 2023) education can significantly influence their decision to major in accounting.

Accounting majors typically perform better in their first accounting course than their non-accounting peers. This trend may be attributed to the evolution of attitudes and perceptions towards accounting education and the profession over time, as evidenced by changes in introductory accounting coursework. The evidence suggests that a student's decision to pursue accounting as their major is often significantly influenced by their experience in their first accounting class. As such, the following implications can be inferred regarding its potential impact:

H4: The impression that students form from their first accounting classes can significantly influence their decision to major in accounting (Cattaneo et al., 2022).

The findings seem to support this notion, as previous research has indicated that students' important judgments regarding their major choice are primarily influenced by their parents and accounting teachers, rather than outside speakers or peers. Based on this, the following hypothesis is proposed to investigate whether students' attitudes and perceptions towards various business fields impact their decision to major in accounting.

H5: It is unclear if famous people have a significant impact on a student's decision to major in accounting.

This chapter serves as a reminder that media and communication technology play a significant role in modern life, shaping individuals' perceptions of the world and their connections with others and society. Despite the wide reach and influence of the information and entertainment industries, there is a lack of research exploring how media and communication technologies impact students' decisions regarding their academic and

career pursuits. Various media tools, such as TV, radio, newspapers, the internet, education fairs, banners, brochures, and offer letters, can potentially influence student decision-making.

Given the potential impact of media and publicity on student decision-making, the following hypothesis is proposed to investigate how these factors may influence a student's decision to major in accounting.

H6: It is unclear if publicity and media play a significant role in students' decision to major in accounting.

2.3 Human Society Theory

Several ideas that aim to emphasize the necessity of moving beyond economic understandings of development have developed. A few discuss very old philosophical ideas about the good life and human flourishing, while others give words like abilities, well-being, and security completely different meanings. In the paragraphs that follow, we'll talk about human rights, human development and capacities, and integrated human development (Al-Hattami, 2023). They were chosen because they can help us learn a lot more about how vocational education and training (VET) relates to development. They are also meant to show how a bigger vision for development can lead to different options for vocational learning.

2.3.1 Human rights

The history of the United Nations is closely linked to the idea that development should be based on human rights. The first important thing the UN said after its founding charter was passed was the Universal Declaration of Human Rights. It set the stage for a global philosophy and practice of human rights. The idea behind the human rights view is that everyone has certain rights. It says that society should pay extra attention to the most vulnerable and poor people. It also changes how human-centered development accounts

think about basic needs, skills, and the millennium development goals (MDG) (Cattaneo et al., 2022).

Since the UN was created after World War II, the human rights approach has had a strong moral foundation. This theory of justice shows how it has tended to favor legalistic and Universalist views of justice. But in recent years, this tendency towards universalism and legalism has become less strong because of a broader and more flexible view of how human rights need to be understood in a complex society.

The MDGs' development can be considered as being significantly influenced by the human rights account, as was already mentioned. But Katerina Tomasevsk, the late UN Special Rapporteur on the Right to Education, is thought to have written what is probably the most important work on education from a human rights point of view (Cattaneo et al., 2022):

- A systemic level of provision's accessibility;
- Access in reality.
- Acceptance of the content, the process, and the quality; and
- Changing to fit the needs of different people and groups

Even though Tomasevski put a lot of importance on education, each of these things can be applied to vocational education and training (VET) in particular. It can find out if any laws make sure everyone has access to VET or at least more people. It can look at how much policy commitments target certain groups, like young people, women, or people with disabilities. if these policies only focus on formal education or if they also include non-formal and private education, as well as learning that happens in both formal and informal places like workplaces, communities, and homes (Cattaneo et al., 2022)..

Practical access is Tomasevski's second area of emphasis. This raises the question of whether there are enough VET learning sites and platforms that are practically

accessible—that is, within the grasp of those who can afford them—for those who want to use them. In this context, it's critical to keep in mind that the majority of individuals will receive VET through their jobs, whether those jobs are in formal or informal economies. So, figuring out how to make high-quality learning more accessible is a key part of the VET accessibility challenge. If workplaces are also important places to learn, both employers and workers could gain a lot (Cattaneo et al., 2022).

Many workplaces, however, do not fit this description, and businesses and even entire industries can prosper without offering any kind of learning support to employees. The goal of VET is to make sure that people learn as much as possible on the job. However, this is not just a VET problem; it also has to do with how work is organized in different sectors and regions and how that relates to global production and consumption. Increased workplace learning may also be driven by the use of new technology, but these decisions will also be heavily influenced by government programs that try to change how producers and consumers act (Cattaneo et al., 2022).

The benefits of new learning technology may include better access for those who were previously disadvantaged. They can provide new approaches to learning that are not only better suited to other time constraints but also more considerate of various learning styles and the diversity of existing bodies of knowledge (Cattaneo et al., 2022).

Some of the new technologies also give students with disabilities new ways to learn different kinds of information and skills. It's crucial to remember, though, that better accessibility is not a given with such technological advancements. Every country has a digital divide, which means that the poorest students often have the least access to certain technologies. But, it's important to recognize the differences between technologies and the dynamics brought on by their quick development. Recent evidence, for instance, shows how mobile learning has a unique potential for reaching out to underserved

regions and groups. This evidence highlights how quickly the capabilities and costs of mobile communications and computing are changing. Even though many students have needs that make face-to-face contact with teachers, support workers, and other students very helpful, it is important to remember that some types of VET learning may not be as good for only distance teaching (Cattaneo et al., 2022).

In response to Tomsevski's fourth worry, we know that formal schooling can be very exclusive, even for many of those who attend. This is done by sending both open and hidden messages about who is allowed in the institution and what kinds of knowledge are important (Cattaneo et al., 2022).

Some students in VET schools around the world are often mistreated because of their gender, race, class, ethnicity, religion, disability, HIV status, or many other things. People can show this kind of bias through their words and actions, but it can also be deeply rooted in the courses offered, the daily schedule, or the facilities. Similar problems can come up at work, and caste, gender, and ethnicity, for example, have a big impact on who can get into traditional apprenticeships. So, it is hard to solve the main problems that keep people from getting a good education and a good job (Cattaneo et al., 2022).

So, a rights point of view can add to the worries we already have about VET. More and more tools are being added to the toolbox to help solve problems fairly and efficiently. Still, it is not clear how much the human rights approach alone helps change the status quo. Even though it is possible in theory, and two United Nations Educational, Scientific and Cultural Organization (UNESCO) studies from 2012 do it, to use a more radical view of what vocational learning is to argue for a much wider range of VET policy options from a human rights point of view, this is not the case (Cattaneo et al., 2022).

2.3.2 Human Development and Capabilities

Examining the human development and capabilities perspective may lead to a more revolutionary set of alternatives for rethinking VET. The theory of human development has changed and become more important since the first Human Development Report came out more than 20 years ago. It has many of the main ideas of human rights thinking, but its main proponent, Sen, is wary of the rights approach's tendency towards universalism and utopianism, as shown by his criticism of Rawls's idea of justice. The 20th anniversary HDR clearly shows how the technique work:

Human development means giving people more freedom to live long, healthy, and creative lives, to work for other goals they have good reasons to value, and to take part in shaping development fairly and sustainably in a shared world. Both individuals and groups of people benefit from and contribute to human growth. So, there are three parts to how people grow:

For individuals to thrive, actual freedoms must be expanded for all. Empowerment and agency: allowing individuals and communities to take action and produce beneficial results. Justice is the pursuit of equity, the long-term sustainability of results, and adherence to human rights and other societal ideals (Cattaneo et al., 2022).

Human development theory has made economic growth less important by focusing on these three things. This is only one part of the Human Development Index (HDI). Also, the HDI is not meant to be a policy that works for everyone. Instead, it's meant to help people talk about what development goals should be in different situations.

The movement for human development has made the human development index (HDI) the most well-known tool, and it has also led to two important changes in the way we think about development.

First, emphasized the importance of the freedom to develop, reflecting the "four freedoms" at the core of the UN Charter, as in the aforementioned remark. Second, he

and others have created the concept of capacities, most notably Nussbaum (Cattaneo et al., 2022).

Walker defines a capability as a possible functioning; the possibilities are unlimited. It could include things like being well-fed, having a place to live and clean water, being able to move around, being smart, having a well-paying job, being safe, being respected, taking part in peer debates, and so on.

The difference between being able to do something and doing it is the same as the difference between having a chance to succeed and succeeding (Cattaneo et al., 2022).

Capability and freedom are two ideas that go hand in hand. Sen's strategy is mainly about giving people "agency freedom" so that they can take action to make the changes they want.

Sen and Nussbaum both think that basic education should get the most attention and that education should be based on rights. Sen thinks that education is also important for fostering other skills and abilities, as well as freedom of choice in general.

But education has not been a major focus of this work. Even though some of Nussbaum's most important works support liberal education and the humanities, these don't have much to do with her work on capabilities and development.

More international education and development work has used a capabilities perspective. Most of this work has also been about teaching people. But show how the method can be used in higher education and how it can help students develop professionally.

On VET and capabilities, a lot of work needs to be done. The fact that skills aren't talked about much in the 2010 HDR, which looks at 20 years of progress in theory and practice in the human development approach, says a lot. Even though one of these sources says that not having enough skills is part of a multidimensional view of poverty, the Multidimensional Poverty Index doesn't take this into account. The Gender Equality

Index is the closest to the three main indexes because it includes the number of women in the labor force (Cattaneo et al., 2022).

To apply capability theory to VET, professional capabilities may serve as a suitable beginning point for illustration. Their focus is on professionals who do bad work, and they suggest the following basic skills for these professionals (Figure 3.3).

This is not a list of words that can be used in any situation. Instead, they stress how important it is for students, teachers, professional organizations, clients, and other interested parties to talk about how to make these capacity sets. Their argument is most useful because it shows how to think about why the capability lens is important and how it can be used in real life. From the point of view of vocational education and training, this group of skills may be more concerned with moral and emotional issues than with practical and technical ones.

Yet, there may be value in employing such a strategy to explore potential conflicts between various viewpoints on the ideal competence set and to take into account what VET occupations and learners value.

Their added emphasis on the institutions that train these experts is also helpful to my case. Their research is mostly about South Africa and the unique problems that universities and "public good professions" have had when switching to a model after Apartheid. Because of this, they have come up with the idea of a way for institutions to connect. This is like the idea of responsiveness in VET. Connectivity is based on a strong sense of social justice, but responsiveness may be criticized for putting the economy and the opinions and interests of employers ahead of everything else. Institutional changes will be a big problem that Walker et alinsights .'s can help with, as long as VET's special relationship with the world of work is taken into account. If the goal of vocational

education and training is to give everyone access to high-quality vocational education, then institutions will need to change (Cattaneo et al., 2022).

Powell's piece in this special edition, another South African contribution, may represent a significant advance in this field's theoretical development. The real chances for vocational learning to help people and communities grow in ways that go far beyond the product-visit dogma. This can be done by listening to the voices of learners and hearing how VET has given them more choices and goals.

Even though the human development and capabilities approach hasn't thought much about VET issues, it's clear that using a capabilities lens to think about what could be learned and how in different VET settings has some promise. The method is most useful, though, when it is taken in the broad sense that human development goes far beyond economics. A bigger focus on well-being and agency can help people come up with a more radical idea of learning for life. In this case, vocational education can be a great way to help people learn for a variety of reasons.

- The following are some examples of such goals:
- For cultural reasons, like learning how to write in Chinese;
- For fun, like learning woodworking for personal satisfaction instead of a trade;
- For communication, like learning how to use email in your "third age" so you can stay in touch with family members who live far away.;
- To help people, like learning how to take care of people with AIDS,
- To help with community development, like learning the skills needed to help with community projects

The main idea behind the capacities approach is that lists like these should only be used as examples since it is up to the person to decide which learnings-for-lives are important to them, as Powell's article shows. This makes those in charge of organizing,

facilitating, or delivering VET think about how it needs to change to fit the different goals of vocational education (Cattaneo et al., 2022).

2.3.3 Comprehensive human development

This broader definition of vocational learning makes more sense when it is seen as a part of a larger human need to learn and grow. A third aspect of human-centered development can help us learn more about this. Both of the first two threads I worked on were based on a strong secular tradition. The third, though, is looked at from a religious, specifically Catholic, point of view.

Over the past few years, people have become more aware of how religion affects growth. But academics haven't talked much about approaches like the Catholic account of Integrated Human Development (IHD), which is similar to human-centered development in many ways.

IHD is different from the first two stories because it didn't start with the UN. Instead, it comes from the teaching office of the Catholic Church, especially in a series of encyclicals written by the popes. Each pope has explained Catholic social teaching in a letter called an encyclical. The first was called "Of New Things" and came out in 1891. The last was called "Caritas in Veritate" and came out in 1965 (Cattaneo et al., 2022).

First, they taught about the causes and effects of the Industrial Revolution in Europe. Then, they taught about communism's rise and fall. More recently, they taught about international growth. The main points of these encyclicals are that the market-state dialectic of modernity is wrong and that both communism and capitalism are bad ideas for making economic and social progress. In these encyclicals, especially Populorum Progression, there are hints of important parts of today's human-centered development views, like freedom, peace, human security, intergenerational responsibility, and environmental stewardship (Cattaneo et al., 2022). For example, researchers have a

responsibility to all men because we are the children of those who came before us and benefit from their work. Researchers can't grow the human family if we don't care about the people who will live after us.

According to this account, it's crucial to strike a balance between a rights-based perspective and a feeling of collective responsibility (Cattaneo et al., 2022): Every person has a responsibility to help every other person grow as a whole person and as a person.

This account is also aware of the dangers of uneven development and a growing gap between rich and poor, but it is also very worried about the danger of super development.

Certain groups experience a kind of wasteful, consumerist "superdevelopment" in deprived communities, which stands in terrible contrast to the continued dehumanizing hardship. 2009's Benedict XVI, p. 23 (Cattaneo et al., 2022).

In response to this, a transcendent vision of integral human development with God's relationship to people at its center is put forward. These shows how important all parts of humanity are and how much each person is worth. Populorum Progressio seems to have been written more than 25 years before Sen when it makes the following argument.

It is not merely a matter of lowering poverty and ending hunger. Fighting the terrible conditions is a crucial and urgent duty, but it is not the only one. It means making a human community where people can live truly human lives without racial, religious, or national prejudice or being forced to work for other people or natural forces they can't yet fully control. It entails creating a human community where the word "liberty" is not just a buzzword.

This prompts a focus on human dignity as the foundation of human progress (Cattaneo et al., 2022). The common good, solidarity, and subsidiarity serve as the three foundations on which this idea is based human development.

According to this definition, the common good is "the whole of the social circumstances that enable people to more fully and conveniently achieve their fulfillment, either as members of groups or as individuals".

As a result, it transcends both the personal and the material. The idea that people have an intergenerational obligation to society and other people is expressed by the word solidarity. According to this definition, individual freedom only has social significance.

According to the theory of subsidiarity, public policy should be biased in favor of the freedom of individuals and civil society organizations. It contends that the government should only get involved when the lower levels are unable to uphold the common good. It emphasizes that the "initiative, independence, and responsibility" of individuals and civil society organizations "must not be superseded" (Cattaneo et al., 2022).

These ideas work together to support the idea that everyone has a responsibility to contribute to the development and that person-centered development must be based on people's inherent strengths rather than the expertise of development experts. It must promote autonomy.

Catholic social teaching has also developed a view on the dignity of work. This view grew out of worries about the threat of revolution at the end of the 19th century and now fits with the International Labour Organization's agenda for decent work (Cattaneo et al., 2022).

Benedict XVI says that work is an important part of growth and development. Similarly, the Pontifical Council for Justice and Peace (PCJP) says that employment is the "essential key" to solving social problems and is necessary for the moral, cultural, and intellectual growth of individuals, families, communities, and the whole human race.

According to this tradition, labor is an essential aspect of being human and serves the greater good: Everyone has the right to work, so everyone who can work should be able

to. So, "full employment" should still be a goal for any economic system that puts fairness and the common good first (Cattaneo et al., 2022).

Employment should never cause worker alienation or instrumentalization. Work should instead always be respectable:

What does the term "decent" signify about work? It means art that, in a certain society, shows how important every man and woman is on a basic level. Work that allows the worker to be respected and free from any kind of discrimination; Work that helps families meet their needs and send their children to school without making the children work; Work that gives workers the freedom to organize and make their voices heard; Work that effectively connects workers, both men, and women, to the growth of their community. Page 63 of the 2009 book Benedict XVI The PCJP says that VET systems should take into account a person's need for skill development throughout their whole life. This should include teaching young people how to look for jobs on their own and how to adjust to changing labor markets. According to the Pontifical Council for Justice (Cattaneo et al., 2022), it should also include any retraining people need, whether they are working or not.

Employment should never cause worker alienation or instrumentalization. Work should instead always be respectable:

The comprehensive human development approach helps us think more broadly while also bringing our ideas back to the real world of work and the traditional VET concerns. Whether or not we see this as religious, the focus on transcendence makes it possible to think of vocational learning as a way to become a full human. So, it can add to the idea of development that is already in the human development account, and it supports the idea that vocational learning would have many different parts. Subsidiarity makes it clear that

it is up to individuals and communities to decide what learning is valuable, which supports Sen's idea of agency freedom.

But, by insisting that labor is essential to development, it also helps to re-grind our ideas about vocational learning. So, there may be a connection to the many nonreligious philosophical schools that have stressed the importance of vocational education in shaping character and values.

The best source for learning more about this secular tradition. This research has tried to show how German theorists of vocational education like List (18th century) and Kerschensteiner (19th century) focused not only on the technical side of vocational education but also on the moral and social sides that gave it its civic and liberal character. Winch says that this German tradition is about developing not only skills but also the virtues of hard work, patience, self-control, and persistence. They are learned less through theoretical study and more through practical problem-solving and interactions at work. Exposure to the industry's rules and standards helps build character (Huning, n.d).

On the other hand, makes a clear liberal case for vocational education in which he says that one of the main goals of liberal education is to be able to support oneself through satisfying work. This is done by repeating some of the IHD method's main ideas.

They say that moral education should teach students how to choose a good way to live and the lawful ways to do it. This leads him to make an argument similar to those of Sen and Benedict XVI. He says that thinking about the goals and limits of one's chosen job may be an important part of a future worker's moral development. By emphasizing that the dignity of work is an important part of human growth, the Catholic tradition makes it clear that if VET and decent work are to get better, capitalism needs to be restructured from the ground up. This is related to the questions raised by the political economy of

skills tradition, which says that VET is shaped by historical, cultural, and political factors.

2.4 Summary

This chapter discusses the theoretical underpinnings of sustainable educational growth. This chapter also discusses views of human civilization and rational behavior. This chapter also talks about how education can increase sustainably.

CHAPTER III: METHODOLOGY

3.1 Overview of the Research Problem

The problem in the context of the Kingdon's three streams framework was the lack of sustainability, which emerged as a concern in the late 1960s with unsustainable development. Since then, international policymakers have repeatedly addressed this issue during international conferences, with the implementation reports of Agenda 21 providing renewed attention to it. According to a report by the UN Secretariat, despite the efforts of governments, international organizations, businesses, civil society groups, and individuals over the past decade, progress towards the Sustainable Development (SD) goals set at Rio has been slower than anticipated, and in some respects, the situation is now worse than it was ten years ago (Zahariadis, 2019).

All of the Member States' national reports expressed similar criticism, as many of the goals established at Rio had not been fully achieved (as stated by Iran on behalf of the

G-77/China). While UN policymakers recognized that unsustainable development was a problem, the issue was too broad and indistinct for them to identify the specific causes of unsustainable development and which sectors were most implicated. Representatives from different fields had varying ideas about the problem's nature and significance, with the social, government, and environmental sectors being the most vocal. Environmental activists were concerned about the deteriorating environment, governance advocates were frustrated with the lack of official development aid, and social activists were focused on poverty reduction. Although the main themes of the Summit began to emerge in the second or third meeting, as noted by United Nations Educational, Scientific and Cultural Organization (UNESCO), it was not until the second half of the preparation process that a clearer definition of the problem of Sustainable Development (SD) emerged, though not everyone shared the same perspective. Nevertheless, the policymakers were compelled to address the issue, as politicians needed to be seen as "doing something" about the problem, as Kingdom suggested.

To solve the problems and test the hypothesis, a complex set of methods was employed. Theoretical methods consisted of examining academic sources related to the research problem, conducting a conceptual analysis of previously completed dissertations, and using simulations. Empirical methods involved analyzing regulatory documents from social welfare institutions and educational documents from universities, conducting experiments and tests, and studying the education of the students.

3.2 Operationalization of Theoretical Constructs

3.2.1 Sustainability of Educational Infrastructure

This philosophy based on SD has shown that it tends to offer workable solutions to environmental problems around the world, and education is no different. A document titled Our Common Future, also known as the Brundtland Report, contains the definition

of sustainability that is most frequently used. The UN Global Commission on Environment with Development is produced in this chapter. According to the commission, sustainability is meeting current demands without impeding the ability of future generations to meet their own needs. It is also about making money, keeping resources and making sure they are shared fairly, and making sure the environment is good enough to support good health, high productivity, along with cultural life. To put it another way, sustainable development (SD) is a broad concept that seeks to promote economic success in a fair and equitable society while preserving the environment as well as the world's limited as well as nonrenewable resources. Nonetheless, it was asserted that living sustainably did not entail a lesser standard of living. Instead, it entails a shift in how people see the pace and manner in which they utilize natural resources. This reform aims to take into consideration social duty, environmental responsibility, interconnectedness across continents, and economic sustainability. Building fundamental educational facilities that can satisfy the demands of students now while also ensuring that they will be accessible to and suitable for use by students in the future is what is meant by sustainable educational infrastructure development.

List the advantages of constructing sustainable infrastructure on college campuses, such as lowering maintenance costs, increasing academic productivity in terms of both quality and quantity, establishing a carbon-neutral environment, ensuring a steady supply of sustainable power, lowering pollution, luring more students, and perhaps even earning an environmental rating. The benefits of sustainable real estate development can be broken down into three categories: economic, social, and environmental.

Even though these important categories were mostly about building homes, they can also be used to talk about the common benefits of the idea of sustainability. On the other hand, some schools of thought have said that sustainability has benefits when it comes to the

above things. The report gave sustainability solutions a low score because it was hard to get a clear picture of how much they cost to build, how much money they make back, and how well they protect the environment. Disappointingly, the idea of sustainability, whether it's good or bad, hasn't been widely adopted in India. This is a cause of the expected poor performance of educational facilities and a reason why only a few students do well in school. People thought that Green Management (GM) and building infrastructure in a sustainable way would be hard to do in developing countries because Lack of information, a lack of public awareness, a lack of certification and rating agencies, a lack of sustainable infrastructure designs, as well as a lack of government involvement utilizing tax benefits or other techniques.

- ***Green Management***

a) Green management refers to the practice of managing an organization in an environmentally responsible way. This involves taking steps to minimize the organization's impact on the environment, while also maximizing efficiency and profitability. Green management can include a wide range of activities, such as reducing waste and emissions, conserving resources, and promoting sustainable practices. It may also involve using eco-friendly products, implementing recycling programs, and investing in renewable energy sources. Adopting green management practices can have many benefits for organizations, including cost savings, improved public image, and increased customer loyalty. It can also help organizations comply with environmental regulations and meet the growing demand for sustainable products and services. Overall, green management is an important approach for organizations looking to balance economic growth with environmental responsibility.

b) Green management is the practice of integrating sustainability principles and environmental considerations into an organization's management of its products, services, and operations. It encompasses the use of environmentally-friendly policies, practices, and technologies across the organization's activities, with the

aim of minimizing environmental impact, preserving resources, and advancing sustainability. The adoption of green management practices can result in increased efficiency, cost savings, and a stronger brand reputation, while also promoting environmental protection and sustainability. Some examples of green management practices include implementing energy-efficient processes, using renewable energy sources, reducing waste and pollution, and promoting sustainable sourcing and production.

c) Green management involves a variety of actions that can be taken, including reducing greenhouse gas emissions, enhancing energy efficiency, minimizing waste and pollution, procuring sustainable materials, and encouraging environmentally-conscious behaviors among employees and stakeholders. These practices are designed to promote environmental protection and sustainability while also benefiting the organization through improved efficiency, reduced costs, and a stronger brand reputation.

d) To achieve effective green management, it is essential to adopt a comprehensive approach that considers the entire life cycle of products and services, from design and manufacturing to usage and disposal. This entails integrating sustainability principles throughout the organization's operations and engaging with stakeholders, including customers, suppliers, and regulatory bodies, to ensure that environmentally-friendly practices are implemented at every stage. By doing so, organizations can not only reduce their environmental footprint but also create long-term value for their stakeholders and contribute to a more sustainable future.

e) The concept of green management emerged during the 1970s as a response to increasing concerns about environmental issues and their implications for businesses and society. While there is no single person or organization credited with originating the idea of green management, it has evolved over time as a result of ongoing discussions and efforts to promote sustainable business practices. Today, green management is a well-established approach to

environmental protection and sustainability that is widely recognized and adopted by organizations across various industries.

Also, it was said that people are less likely to adopt and use an idea if they don't learn about it and its principles in school. It also recommends green infrastructure or building retrofits for aging structures. This means making changes to make them more sustainable and lessen their physical, functional, and economic obsolescence, which usually leads to more and more buildings. Still, India does not know about green retrofitting, even though it has been used in developed countries for a long time

The following research hypotheses were made to find out how much sustainability and GM affect how well schools work:

H_{01} - Sustainability plays a crucial role in the performance and efficiency of Indian school buildings. In India, many school buildings are designed and constructed without considering environmental sustainability factors, which can result in high energy consumption, poor indoor air quality, and limited access to natural light and ventilation.

H_{02} - Green Management (GM) can have a significant impact on how well schools in India perform their roles. Green Management refers to the practices and processes that promote sustainable and environmentally friendly operations in organizations, including schools.

H_{03} - Sustainability refers to meeting the needs of the present without compromising the ability of future generations to meet their own needs. Green Management, on the other hand, refers to managing organizations in a sustainable and environmentally responsible way. Both concepts aim to reduce environmental impact, improve resource efficiency, and promote long-term sustainability.

H_{04} - The importance of sustainability in the design and operation of educational facilities in India. By adopting sustainable practices and implementing Green Management strategies, schools in India can reduce their environmental impact and

improve resource efficiency, which can have a positive impact on the performance of educational facilities.

3.2.2 Green Management Affects the Performance of a Building

SD and Green Management (GM) are the same things because they both aim to make the world more interconnected, accountable to the environment, socially responsible, and economically viable. It can also be seen as an operational concept that is set up to support the parts of a sustainable concept that has been adopted because it has many green benefits. Similar to this, the concept of "green management" emerged from the requirement to examine product elements, the rate at which various products were used, how waste was disposed of or recycled, and whether there were better alternatives to toxic or non-biodegradable products at all levels of global activity. The GM method, however, is unique to the construction industry and focuses on the proactive management of three areas: green building, green energy, and green rubbish.

As a result of the modification, rating systems for facilities and properties exist in both developed and some developing nations worldwide. The Leadership Award for Energy and Environmental Design ranks green buildings and ecosystems in the United States. In the UK and Singapore, respectively, this was performed using the Building Research Establishment Environmental Assessment Method and Green Globe with Green Mark. Promoting green schools is primarily the responsibility of the U.S. Environmental Protection Agency (US-EPA), the Partnership for High-Performance Schools (CHPS), and the U.S. Green Building Council (US-GBC). However, in India, neither a government agency nor a non-governmental group has the authority to determine how eco-friendly a material is in terms of the environment as a whole and the infrastructure it is used to develop. Similarly, no one is in charge of ensuring that schools are environmentally friendly and use sustainable resources.

This chapter argues that GM is important and necessary from the very beginning when the idea for building infrastructure is first thought of, until the very end of its life cycle, when it is completely obsolete and ready to be redeveloped or retrofitted, whichever is appropriate. Sustainability and GM must be taken into account in all aspects of the construction and maintenance of buildings and infrastructure. As a result, many academics contend that the concept of sustainability and GM forms the cornerstone for the overall perception of a building's or facility's performance.

Buildings function better when certain guidelines are followed, as PAEVERE and BROWN discovered. They also said that the idea led to better health and a more comfortable place to work, which made it easier to find new employees and keep the ones you already had. This is important for the welfare and productivity of workers. In the same way, it was said that sustainability and GM ideas can cut down on the number of buildings or facilities that are built and the amount of energy that is used. This means that a concept called retrofitting could be used to change stocks that aren't sustainable into ones that are. This would stop the wasteful or inefficient use of resources, such as the random construction of buildings or facilities. The world would be a better place as a result. The recommendations of the USGBC and the Health and Learning Report by the US National Academy of Sciences, which emphasizes the adoption of green design principles and engineering standards for green school buildings, state that the performance of sustainable educational buildings and facilities will determine which green features need to be added during the pre-construction and post-construction phases. It is reiterated that the following should be used to design and maintain green school buildings and facilities:

a) Utilizing environmentally friendly and energy-efficient technology,

b) Avoid using hazardous building materials and instead turn to recyclable ones,

c) Assuring that the air inside is safe and healthy for students,

d) Avoid using hazardous building materials and instead turn to recyclable ones,

e) Effective building management and control system,

f) Making good use of water (recycling water),

The study examines the long-term viability of educational facilities and buildings in India using the aforementioned criteria.

3.2.3 Green Retrofitting of School Buildings and Impact on Academic Performance

Making changes to an existing building or facility, either whole or in part, to effectively and efficiently preserve resources is known as green retrofitting. This is done by reducing energy use, reusing old materials, and recycling materials to make the building last longer without having to pay for demolition and new building materials. The goal of retrofitting, according to this chapter, is to improve the performance of existing structures as opposed to tearing them down and creating new ones. According to XU et al. (2012), the retrofitting approach may boost the pleasure of individuals who dwell in existing buildings and the ecology as a whole by decreasing energy waste and pollutants brought on by outmoded structures, which significantly contribute to global warming.

Due to the lack of consideration for green building practices and methods during construction, the majority of currently used educational facilities are not sustainable. This could be because no one thought ahead or because the concept of sustainability didn't exist when the building was built. Some researchers were worried that designs that can't be kept up for a long time could hurt how teachers teach and how well students do in school, especially in developing countries. This demonstrates the value of the study environment and green school design for effective teaching strategies that will improve students' academic performance and quality of life. The building that has been modified can serve as a model project for urban regeneration in addition to the environmental

advantages of sustainability that can be obtained from retrofitting. This will alter how the local economy and the region's economy grow.

This could also happen in some schools that have been around for a long time and are now considered historic landmarks. The first and second generations of universities were established in India. This shows that many educational buildings and facilities that were planned and built during this period did not comply with the core principles of sustainability. Even Nevertheless, the majority of these structures are attractive and may not even need to be demolished. Instead, they may be altered to improve sustainability, user satisfaction, instructor productivity, and academic performance for kids.

3.2.4 Using and taking care of a green facility

Sustainability and "green management" are also about making sure that infrastructure is used and kept in a way that is good for the environment. This may sound strange or unusual, but it is very important if the idea is to be taken and used correctly. People often spend money on infrastructure and facilities, but in developing countries like India, it can be hard to set up a good maintenance culture and handle things carefully.

The bad thing about this is that it leads to a lot of early obsolescence, no matter how long-lasting an infrastructure or facility was when it was first built. Hence, maintenance measures must be carefully considered and documented from the beginning to achieve the objective of embracing the idea, which involves, among other things, obtaining the greatest level of happiness for the least amount of money. In the same way, most infrastructure facilities can have their lives cut short by bad use. In the same way, a facility or installation can be partially neglected if it can't be used to its full potential. It can also be abused if it's used too much or in an inappropriate way. Thus, a comprehensive manual must be made available to ensure that it is used properly. Establishing a protective strategy that will stop the incorrect management of

infrastructure is essential. Regular proactive inspections will ensure that a facility is used by the operational rules, which must involve extensive employee training. By taking these actions, the majority of maintenance costs—both anticipated and unforeseen—can be reduced or even eliminated.

3.3 Research Purpose and Questions

This study set out to critically examine the evidence on the effects of interventions in development education. The review of the literature was based on the following research question: What are the effects of interventions like intentional development education, ESD, and Global Citizenship Education?

- How do researchers in Early Childhood Education (ECE) describe ESD)?
- What are the most important questions and results of the research?
- What does the research say about how young children can make a difference in the world?

  The study will answer the following research questions to help fill the gap.

- To find out how scientific articles about Engineering Education for Sustainable Development (EESD) are changing around the world.
- To provide bibliometric information on 1,995 studies done between 2010 and 2023 that was gathered from the Scopus database.
- To find the top authors in the field of EESD research.
- To use a collaboration map to understand how people work together in this field.
- To learn about the most important institutions, countries, and journals in EESD and
- To figure out where EESD research might be lacking.

3.4 Research Design

The performance of an education facility is the main thing that this survey looks at as a dependent variable. To get a full image of this, the independent variables were broken up into sections in the questionnaire. In these parts, the focus was on issues related to the demographic status, and excerpts from the reviewed literature were used to explain these issues. These factors included how familiar people were with the idea, how good people thought a sustainable building would be, how easy it would be to get green features, and how bad it was to not have green features in an educational building and Williams College. In essence, the clusters' common informational aspects served as the foundation for the respondents' perspectives: In the section for the expert opinions of in-residence building professionals, barriers to concept appropriation got more attention. Most of the questions were made using a Likert Scale, which is a 5-point rating scale. This was done so that the answers of the respondents could be judged based on their level of importance, approval, or agreement with the most important variable items, which were given values from 1 to 5 that went from the least negative to the most positive.

A research design is to the experimenter what a blueprint is to the architect. The design tells what observations to make, how to make them, what statistical tests to use, how to analyze the quantitative data that is gathered, and what possible conclusions can be drawn from the statistical analysis.

This study was almost like an experiment because it used both a control group along with an experimental group. A control group design that didn't compare was used. Using Raven's Progressive Matrices, both the control along with experimental groups had the same level of intelligence. They also had the same level of knowledge, critical thinking, problem-solving, and value issues when it came to ESD. The difference between a quasi-experimental design and a real experimental design is that in a quasi-experimental design, samples are not chosen at random from a given population, nor are they put into

experimental and control groups at random, as is done in an experimental design. Since it wasn't possible to put people into groups at random for this study, a quasi-experimental design was planned. Since it ensures that the program's causes and effects are obvious and has a high level of internal validity, a quasi-experimental design is frequently employed in these types of investigations. It shows that the program had a connection to the dependent variables that were taken into account. Two things set the true experimental design apart from the quasi-experimental design. First, the participants are not picked at random from the population given, and second, they are not put into the experimental with control groups at random. Yet, quasi-experimental approaches offer scientists a good deal of control over studies conducted in natural environments. They are an advance over pre-experimental designs because they allow researchers to compare the performance of the experimental group to that of a control group. In other words, by utilizing quasi-experimental methods, researchers may transfer their findings from the lab to a natural environment or context. Without comparing the two groups, this study used a control group design. Participants in this study were not selected at random from the general population or assigned to groups at random, in contrast to the pre-test-post-test control group design. Similar to the static-group comparison approach, this one gives both groups a pre-test that may be used to see if they are similar despite not being paired randomly. This tactic is demonstrated in the diagram below.

In this example, where X is the experimental treatment and O is the measurement of the dependent variable either before or after the experiment, the broken line denotes that the experimental and control groups were not assigned at random.

Choosing who will be in the experimental group and who will be in the control group is the first step in the design process. The experimental group and the control group should be as comparable as feasible. It is believed that the selection of the groups is random. This design was chosen for this study because it is a good way to look at how an integrated approach to education for SD affects knowledge, critical thinking, problem-solving, and values in a natural setting without controlling or manipulating the variables, which could change the atmosphere of the classroom. Figure 3.1 shows how this study was put together.

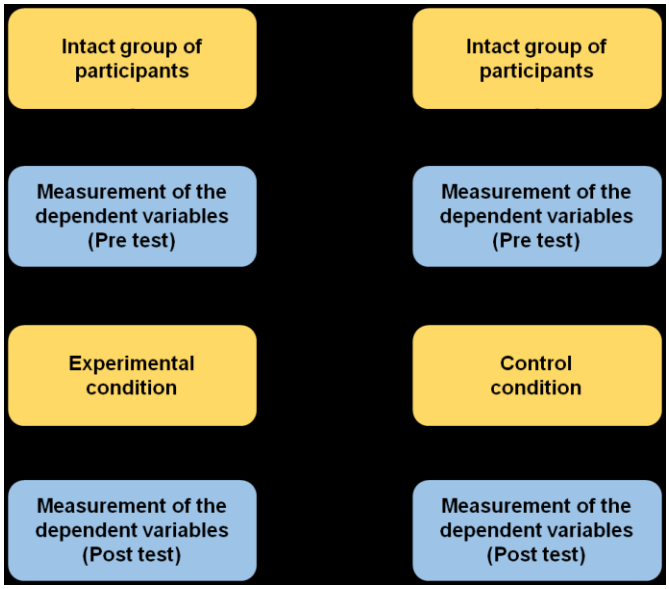

Figure 3.1

Nonequivalent control group design

More than that, this design takes care of the things that could change the performance of the experimental groups, such as maturation, selection, the interaction between selection and maturation, death, instrumentation, testing, and past performance. The statistical regression that might affect how well the experimental group performs cannot be controlled by the non-equivalent control group design. The experimental treatment,

diffusion, compensatory rivalry by the control group, and resentful demoralization of the control group are the four dangers to internal validity that have an impact on the performance of the control group. You can put an end to these dangers by giving the children in the control group an alternative but equally effective remedy. If the discrepancy in post-test results between the experimental and control groups were caused by starting differences rather than the effects of the independent variable, that would be the main reason that could undermine this design's internal validity. The pre-test means of the groups were modified by ANCOVA to prevent the initial difference between the experimental and control groups from growing too high.

Campbell says, In this popular design, it is always wrong to try to correct for the lack of perfect equivalence by matching on pre-test scores. Regression artifacts are produced as a result. Alternatively, one should make do with any initial pre-test discrepancies by employing gain scores, visual display, or analysis of covariance. After the Post-test, ANCOVA produces the same outcomes as matching without removing any subjects or rearranging them in any way. The researcher chooses two full groups, subjects them to the experiment, and then modifies the post-test means to account for the fact that the two groups are not identical. ANCOVA is the best tool for this design if the assumptions on which it is based can be met.

Table 3.1

Using a non-equivalent control group design, the study's phases, tools, and interventions are presented

PHASE	CONTROL GROUP	EXPERIMENTAL GROUP
Intervention (5 months)	Control condition (Textual content using	Experimental condition (Integrated approach to

	lecture method and experiments)	Education for sustainable development)
Pre-test (Two days/ 4 hours)	• Value preference scale • Knowledge test • Critical thinking test • Intelligence test • Problem-solving test	• Intelligence test • Knowledge test • Critical thinking test • Problem-solving test • Value preference scale
Total No. of students (N)	35	37
Post-test (Two days/ 3 hours 15 minutes)	• Knowledge test • Critical thinking test • Problem-solving test • Value preference scale	• Problem-solving test • Knowledge test • Value preference scale • Critical thinking test
Class	VII A of Chinmaya, Vidyalaya, Payyannur	VII B of Chinmaya, Vidyalaya, Taliparamba

In any kind of research, the researcher has to plan out the whole thing and decide on a method. So the researcher does some things. The word "design" means "to make a sketch, plan, or arrange details."

Research design is the plan you make for your research based on the method you choose. It shows the steps you need to take. Research design is important because it makes it easier for all the different parts of the research to go smoothly. This makes research as efficient as possible, saving effort, time, and money. It is a way of thinking about how research should be done. It is the plan for getting data, measuring it, and figuring out what it means. It is used to show how the main parts of a research project work together to try to answer the main research question. For an educational research project to be

successful, it must be planned, done, and evaluated systematically. The research design for this study is given below (figure 3.2):

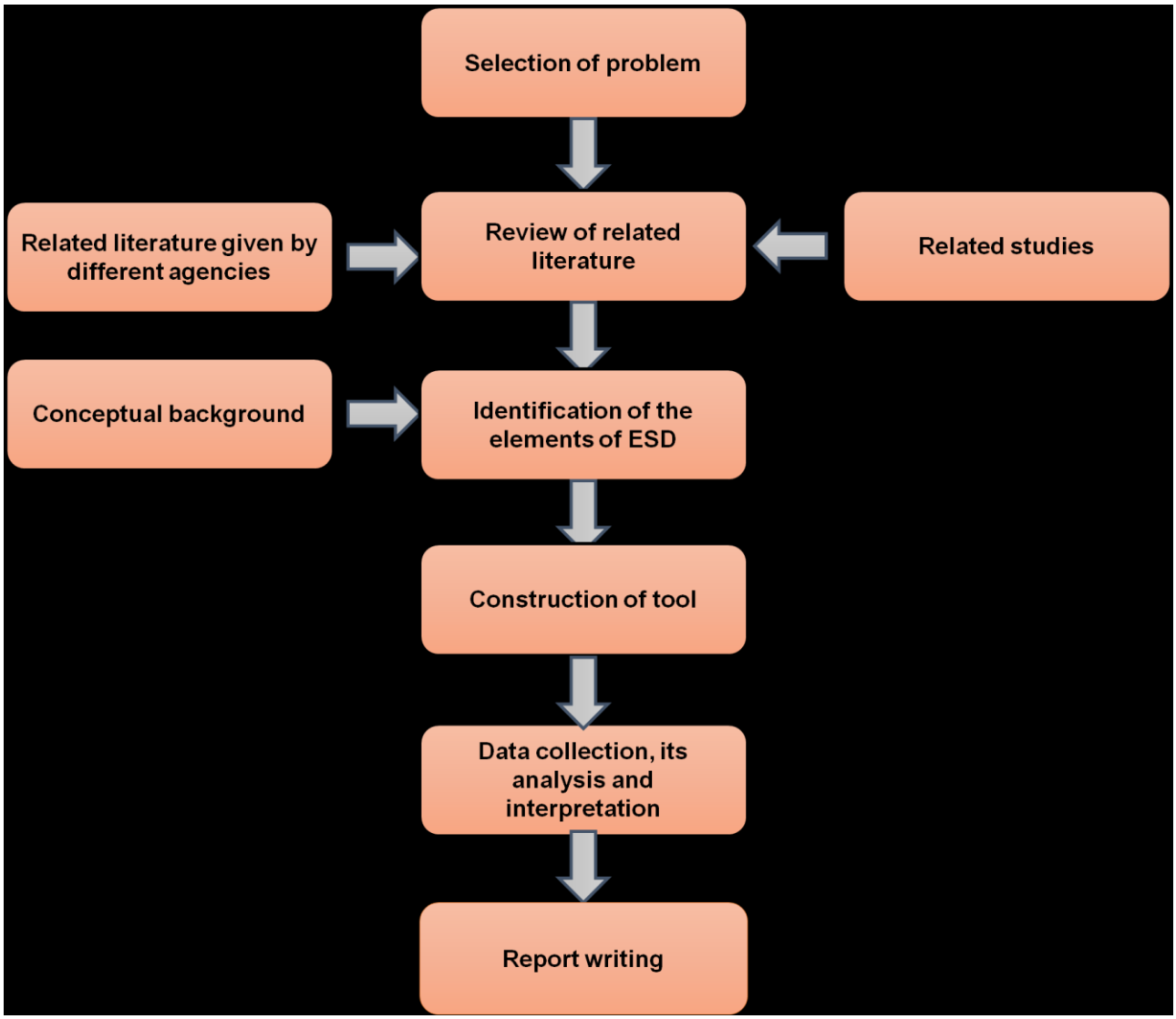

Figure 3.2

Research Design

3.4.1 Data analytic technique

The data were examined using IBM SPSS Statistics Version 21 and some of the findings were verified using STATA Version 14.2 from the Stata Corporation in College Station,

Texas. Next, factor analysis was used on the 32 observed variable items that had to do with the benefits of developing facilities in a sustainable way, which was the main goal 1. This was accomplished using Principal Component Analysis (PCA), which was used to determine how the same factors in the independent variables affected the dependent variable. The use of this tool was predicated on the dataset meeting fundamental prerequisites and assumptions, such as the absence of outliers, a minimum ratio of cases per item of at least 5:1 but preferably 20:1, a minimum sample size of 200 cases, a Cronbach's Alpha for the internal reliability test of at least 0.7, and factorability checks using the Kaiser-Meyer Olkin (KMO) of >.5 and Bartlett's test.

The performance of educational facilities, which was objective 2, was examined using a sample T-test to see how the availability of green features and the issues with unsustainable infrastructure affected those performances. T-Test Analysis was also utilized to assess the significance of factors preventing people from using sustainability and GM practices to achieve objective 3. Correlation and regression analyses were performed to determine whether the concepts of sustainability and GM have any impact on raising the performance of educational institutions in India while keeping in mind the setup assumptions.

3.5 Population and Sample

164 university instructors, 122 postgraduate students studying the built environment, and 114 in-house building specialists had all contributed to the development and administration of educational facilities. To gain a thorough understanding of how SD and the application of the GM, concept affect infrastructure/facility performance, this research population was chosen. This is because infrastructure/facility performance is viewed as one of the most significant components in creating a good learning environment where staff and students can do their best work without problems.

3.6 Participant Selection

T-Test Analysis was also utilized to determine the significance of factors that prevented people from using sustainability and GM principles to fulfill objective 3. Correlation and regression analyses were used to determine whether the concepts of sustainability and GM have any impact on raising the performance of educational facilities in India in light of the setup hypotheses.

3.7 Instrumentation

To determine how the common elements in the independent variables affected the dependent variable, factor analysis was performed to examine the correlations between them. This was accomplished by employing PCA as the analytical tool and the extraction method.

3.8 Data Collection Procedures

For this study, workers and students at a university filled out a questionnaire that was used to get first-hand information. 400 persons from four universities in the southwest of India—Jain university, Bangalore city university, and Adichunchanagiri university—were issued questionnaires to ensure that the sample size was sufficient.

3.9 Data Analysis

The main analysis was done with IBM SPSS V-21, and key findings were checked with STATA Version 14.2 (Stata Corporation, College Station, Texas). Then, factor analysis was used to see how the basic items in the independent factors were related to each other and how they affected the dependent variable. PCA was used as the method of analysis to look at how the basic items in the independent factors were linked to show how they affected the dependent variable. Before this tool could be used, it had to meet some basic requirements and test some hypotheses. These requirements included that there could be no exceptions, that the participant-to-item ratio had to be at least 5:1 but preferably 20:1,

that the sample size had to be at least 200 cases, that the internal reliability assessment's Cronbach's Alpha was at 0.7, that the Kaiser-Meyer Olkin (KMO) had a value of >.5, and that Bartlett's test was used. Once these were determined, we used the Component Plot of Factor Loadings and Eigenvalue to determine which variables would be kept at a factor loading >1 (or unit of variance >1) and the Orthogonal (Varimax) Rotation in F-Dimensional Space to make the factor configuration easier for researchers to understand.

Goal 2 was attained by using a sample T-test to examine the relationship between green attributes and educational institutions' efficiency. The problems with non-sustainable design's-test analysis were also used to determine the significance of factors that make it difficult to implement environmental and sustainability policies. So that objective-3 could be reached. Keeping in mind the hypotheses we set up in the introduction, we used both regression and correlation tests to see if sustainability and environmental management have any effect on making India's educational institutions more effective.

3.10 Research Design Limitations

Because ESD isn't well known in our country, it was hard for people to understand the questions on the scales. This was one of the most important problems with our study. Before the scales were given out, a test run was done to see how well the questions could be understood. Before the application, the respondents were told a little bit about ESD and their questions were answered. Also, you could say that the results of our study only apply to people who want to become teachers and are studying in Bursa, Turkey.

Lastly, the fact that the data come from SATs and are used to make indicators limits the conclusions that can be made. Examining indicators allows for a rich comparison of SATs, but it doesn't tell us anything about the systemic relationships between indicators or how likely it is that SATs will be able to drive SD in the context of HEIs at this level. Even though a good assessment of sustainability is required and necessary for HEIs to

improve their effects on SD, it is not enough to tell how much those improvements happen. This needs more research that is outside the scope of this study.

3.11 Conclusion

This chapter showed how the data was collected, what the questionnaire was, and where the data came from. Also, the ways that the data were analyzed were explained so that the collected data could be described, visualized, and judged. this chapter also covers the research design and overview of the research problem.

CHAPTER IV: RESULTS

4.1 Research Question One

1. What challenges are educators facing in implementing Education for Sustainable Development (ESD) in classrooms, and how are they addressing these challenges?
2. How does ESD shape learners' beliefs and attitudes towards sustainability and their responsibility towards the environment?
3. What role do peer interactions and social networks play in the relationship between ESD and students' sustainability knowledge, attitudes, and behavior?
4. How does ESD certification contribute to the overall goal of creating a more sustainable society, and what challenges or limitations are associated with this approach?
5. How do the principles of holism and pluralism shape the design and implementation of ESD curricula and pedagogical approaches?

4.2Research Question Two

1. How are pre-service primary teachers being prepared to integrate ESD principles into their teaching practices?
2. What are the best practices for integrating ESD principles into teaching and learning, and how can these practices be adapted to different educational contexts?
3. In what ways do primary teacher educators incorporate ESD principles into their own teaching practices, and how do they model these practices for their pre-service teachers?
4. What are the perspectives of businesses and industry leaders on the role of ESD in promoting sustainability and responsible environmental stewardship,

and how can these stakeholders work collaboratively with the education sector to promote ESD?

5. In what ways can primary teacher educators, academics, and environmentalists work collaboratively to promote the adoption of ESD principles in primary schools, and how can their collective efforts contribute to the overall goal of creating a more sustainable society?
6. What role can policy and decision-makers play in supporting the development and implementation of effective ESD models or programs in pre-service teacher education, and how can these stakeholders be effectively engaged in the process?

4.3 Summary of Findings

4.3.1 Data on the population

Table 4.1 provides the critical backdrop for the sample frame about the educational standing of the institutions and respondents in the study area. The findings show that at least 50.7% of the respondents went to schools that were established in the 1960s and 1970s.

The fact that employees, students, or even in engineers and building specialists have between 16 and 20 years of management experience in educational institutions further demonstrates the usefulness of the data acquired for this study. Similar to this, various building industry specialists who are employed on-site at the universities under consideration made up 28.5% of the sampled population.

The knowledge of experts in engineering, estate surveying, town and country planning, quantity surveying, architecture, and building technology helped in the collection of reliable data about what is possible in terms of the level of sustainability and green management of the current educational facilities in comparison to the barriers to adopting sustainable development in the Nigerian educational sector.

Table 4.1

Background data about respondents and institutions

Background Information	Frequency (F)	Percentage (%)
Organization responding		
Jain University	103	25.8
Bangalore city university	117	29.2
Adichunchanagiri university	86	21.5
Bangalore Institute Of Technology	94	23.5
Total	400	100.0
Institution's Year of Establishment		
1948s	103	25.8
1965s	203	50.7
2005 yrs	94	23.5
Total	400	100.0
Respondent		
Post School Students	122	30.5
University Teachers	164	41.0
Building Professionals	114	28.5
Total	400	100.0
Years in Service		
4yrs	1	0.3
8yrs	10	2.5
14yrs	22	5.5
17 yrs	276	69.0

24 yrs	62	15.5
27 yrs	29	7.3
Total	400	100.0
Academic Background		
SSCE/NABTEB	23	5.8
Ordinary National Diploma (OND)	79	19.7
Higher Dip/B.Sc./B.A/B.Ed./PGD	68	17.0
M.Sc./M.A/M.Ed.	200	50.0
Institute of Chartered Accountants of India (ICAI)	40	10.0
PhD	30	7.5
Total	400	100.0
Professional Affiliations of Respondents		
Association of Principal Administrators in India Universities	35	8.7
India Institute of Science Laboratory Technology (IILST)	38	9.5
India Society of Engineers (ISE)	28	7.0
India Institute of Architects (IIA)	12	3.0
India Institute of Town Planners (IITP)	21	5.3
India Institute of Builders (IIOB)	14	3.5
India Institution of Estate Surveyors and Valuers (IIESV)	23	5.7
India Institute of Quantity Surveyors (IIQS)	16	4.0
Total	400	100

4.4 Respondents' Opinions on Academic Performance and Sustainable Educational Facilities, Section

The opinions of the respondents in three categories—graduate students, university professors, and registered building professionals—were gathered to determine the green features that are considered to be elements that can affect how well students do as well as how effectively university lecturers execute their services. They may also help enable construction professionals' ideas for assuring the educational facility's sustainability. Table 4.2 summarises the opinions of 122 post-graduate students on the value of having access to green resources for their performance. The observed mean values for having access to clean indoor air and a calm learning environment vary from 1.0738 to 1.3197, respectively. Furthermore, 164 academics at universities rank the environmentally friendly components of Table 4.3 that could improve their service delivery. For sufficient natural lighting and a calm (eco-friendly) learning environment, it was discovered that the mean score of green elements taken into account ranged from 1.2220 to 1.2783.

Table 4.2

Features of green architecture that can raise pupils' academic performance

		Responses					
Green features	Mean value	It would improve my academic performance		My academic achievement wouldn't be affected by it.		Total	
		F	(%)	F	(%)	F	(%)
Inside is pollution-free.	1.0739	114	92.7	10	7.5	123	100.0
Daytime	1.1476	105	85.3	19	14.9	123	100.0

natural lighting improvements							
Power-saving installations	1.2132	97	78.8	27	21.4	123	100.0
Noise and air pollution are not present.	1.1640	103	83.7	21	16.5	123	100.0
Academic environment	1.3198	84	68.1	40	32.1	123	100.0

Table 4.3

Design Components of Green Characteristics that May Boost Academic Productivity in University Instructors

Responses							
Green features	Mean Value (M)	It would raise my grade point average.		My academic achievement wouldn't be affected by it.		Total (Tot)	
		(F)	(%)	(F)	(%)	(F)	(%)
natural ventilation (indoor air)	1.1464	141	85.4	25	14.7	165	100.0
Adequate natural	1.1221	145	87.9	21	12.3	165	100.0

illumination							
Energy conserving Installations	1.2257	128	77.5	38	22.7	165	100.0
Absence of noise and air pollutions	1.1586	139	85.1	27	16.1	165	100.0
Serene (eco-friendly) academic environment	1.2684	121	73.2	45	26.9	165	100.0

The major factors to be taken into account while creating or maintaining a sustainable educational institution are discussed by 114 construction industry specialists in Table 4.4. The reported mean values vary from 1.2018 to 1.4386 for the two categories, Conservation of Land Resources and Consideration for Sufficient Natural Lighting during the Design Stage. It is crucial to keep in mind that the views of this specific group of respondents are important for the creation of a sustainable facility since they serve as the foundation for the other two categories that make up the facility's users. In other words, the design and construction of a sustainable facility by the building specialists are dependent upon the academic output of university lecturers and the academic performance of students.

Table 4.4

Opinions of Building Experts on Green Components Facilitating Sustainable Educational Facilities Design and Construction

Building a sustainable educational facility is made possible by using green technologies.	Responses						
	M	It is crucial for environmentally friendly construction and upkeep of facilities.		It is not crucial for environmentally friendly building construction and upkeep.		Total	
		(F)	(%)	F	(%)	F	(%)
Eco-friendly \construction instruments and methods	1.2106	91	79	25	21.2	115	100.0
Using biodegradable materials in construction	1.3159	79	68.5	37	31.7	115	100.0
Preserving water both during and after construction	1.2808	83	72	33	28.2	115	100.0
Using energy efficiently both during and after construction	1.2633	85	73.8	31	26.4	115	100.0

A design stage consideration for appropriate natural lighting	1.2019	92	79.9	24	21.3	115	100.0
At the design stage, take into account the need for enough indoor air	1.1755	95	82.6	21	17.6	115	100.0
The sustainability of educational facilities requires effective maintenance policies.	1.3597	74	64.1	42	36.1	115	100.0
Conservation of land resources	1.4387	65	56.2	51	44	115	100.0
Interface control for sustainable facilities is simple.	1.2983	81	71.2	35	29.9	115	100.0
Installation of functional building fixtures and components	1.3685	73	63.3	43	36.9	115	100.0

The appropriate design for controlling erosion and flooding	1.4212	67	58	49	42.2	115	100.0
Retrofitting the current building to at least a sustainable standard	1.3685	73	63.3	43	38.9	115	100.0

4.4.1 Objective 1: Sustainability Ideas' Effects on Facilities Performance

Internal reliability and factorability testing were performed on all 43 items of the perceived benefits of SD on educational institution performance, as shown in Table 4.1. According to the Cronbach's Alpha test, which showed a collective value of 0.929 over the usual minimal value of 0.9, the collection of these variable items in this regard is internally reliable for this study. Both Bartlett's Test of Sphericity and the Kaiser-Meyer-Olkin (KMO) factorability test yielded comparable outcomes in the same table, with a Measure of Sampling Adequacy of 0.594 and merely a Significance level of 0.011, respectively. A standard KMO of 0.5 and a P value of 0.05 were also necessary for Bartlett's test, and these results met those requirements as well.

Table 4.1

Results of the Perceived Advantages of Sustainable Facility Development Reliability and Factorability Tests

Reliability Statistics	
Cronbach's Alpha	.798
N of Items	29
KMO and Bartlett's Test	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	.499
Approx. Chi-Square	.770
Bartlett's Test of Sphericitydf	11
Sig.	.000

The responses to 32 variable items that were categorized into 5 criteria were used to determine the respondents' perceptions of the advantages of environmentally friendly educational facilities. There was overall internal dependability, as shown by the values of each item's Cranach's Alpha in Table 4.2. Nonetheless, the observed mean values showed that respondents gave each benefit varying degrees of priority. In this regard, the "simplicity of implementing the master plan" has the lowest mean value, with a mean value of 3.97, and the "capacity to have maximum use of an educational institution" has the highest mean value of 5.01. The respondents' reflected perceptions provided insight into their level of awareness of how green benefits could boost educational facilities' efficiency. One may argue that this situation contributed to the spread of notions of sustainable development and green management.

Table 4.2

Testing for Reliability of Advantages of Perceived Sustainable Educational Facility Development Factors

Item-Total Statistics						
Component	Variable Items of Perceived Benefits of Sustainable Educational Facility and Green Management	Mean Value	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1	Lowest Possibility of Resource Misappropriation					
	Lower chance of project failure	3.78	145.10	23.645	.754	.809
	Avoidance of frivolous resource allocation	4.84	145.04	24.957	.744	.814
	Prevention of functional obsolescence	4.90	144.98	26.055	.544	.821
2	Improved Facilities Value and Performance					
	High level of facility functionality	3.96	216.92	27.837	.001	.834
	Use of facility to the fullest	4.98	144.90	27.796	.035	.833
	The pleasure of facility users	4.93	216.92	26.828	-.010	.835
	Facility's retention	4.89	144.99	25.390	.738	.817

	of core values					
	The prestigious appearance of the facility	4.89	144.99	27.021	.230	.830
3	Construction and Maintenance Cost Reduction					
	Environmentally friendly tools and methods for construction	4.84	145.05	25.600	.559	.820
	Use of biodegradable construction materials	4.90	144.99	26.697	.332	.827
	Water conservation	4.95	144.93	26.807	.418	.286
	Efficient energy utilization	4.90	144.99	26.697	.332	.827
	Maintenance cost reduction	4.90	144.99	26.697	.332	.827
	Ease of master plan implementation	4.08	145.80	24.253	.830	.810
4	Eco-friendly Educational Environment					
	Preservation of the ecosystem	4.25	145.63	26.021	. 389	0825

	Conservation of land resources	4.12	145.75	24.767	.618	.816
	Well cultured landscapes	3.26	135.63	36.695	.22	.830
	Low impact of facility construction on the environment	4.20	145.69	25.519	.566	.820
	Construction waste minimization	4.14	145.74	24.132	.756	.811
	Carbon-free academic environment	4.90	144.98	26.379	.436	.825
	Reduced cost of maintenance of the environment	4.25	145.63	26.021	.389	.825
	Possibility of becoming a highly rated institution of learning	4.49	145.39	27.340	-.036	.862
5	Improved Staff and Student Productivity					
	Reduced staff and students absenteeism and redundancy	4.90	144.98	27.470	.160	.825

Decreased health and safety risk	4.96	144.92	25.401	.431	.831
Less expenditure on medical bills and hazard allowances claims	4.84	145.04	27.470	.436	.823
Improved creativity and academic excellence	4.96	144.92	26.379	.160	.831
Boosting staff and student morale at work or study	4.90	134.86	27.470	.436	.825
Improved indoor air quality for staff and students' welfare	4.96	144.92	26.379	.160	.831
Appreciable daylighting through natural illumination	4.95	144.93	26.483	.565	.824
Reduced complaints about the comfortable educational facility	4.84	145.05	24.085	.710	.812

The simplicity of facility interface control	3.60	146.28	28.739	-.172	.864
Pleasurable and satisfied work and study conditions	4.96	144.92	28.160	-.131	.836

The 32 variable items were then analyzed in connection to the 5 components, as indicated in Table 4.2. As a result of principal component analysis, the bulk of observed or felt advantages were included in just two factors. According to Table 4.3 and Figure 4.1, components 1 and 2 have eigenvalues of 2.620 and 1.056, respectively (a component plot of factor loadings in rotated space). This shows that the customary requirement of >1 for the extraction of any factor was met by components 1 and 2. Even the results of the varimax rotation, shown in Figure 1, helped us understand how the other 3 components were loaded onto the 2 extracted components.

Table 4.3

Perceived Advantages of Sustainable Facility Development Factor Analysis

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.05	21.118	73.511	1.05	21.118	21.118	1.58	31.747	13.511

	7			7			8		
2	2.62	52.393	52.393	2.62	52.393	53.393	2.08	41.765	41.765
	1			1			9		
3	.524	10.456	96.911						
4	.155	3.091	100.000						
5	.648	12.947	86.456						

The components 1 and 2 maintained factors in this clause are Improved Facility Value and Performance and Eco-friendly Educational Environment. The list of variables grouped under these two criteria represented the respondents' expectations for educational facility performance based on their knowledge of the advantages of sustainability and green management practices and their capacity to achieve related objectives. With matching eigenvalues of 0.647, 0.523, and 0.154, the final three non-loading components are Construction and Maintenance Cost Reduction, Improved Staff and Student Productivity, and Minimum Risk of Resource Misappropriation. Even though the factor reducing construction and maintenance costs was not kept, the loading of it suggested that local building professionals had supported it because they could contrast the costs of routine construction and maintenance with the potential for cost savings as one of the advantages of implementing sustainability and green management concepts in the effort to enhance educational facility performance. This suggested that on 19 of the 32 variable characteristics of perceived green benefits, there was just a limited amount of information available.

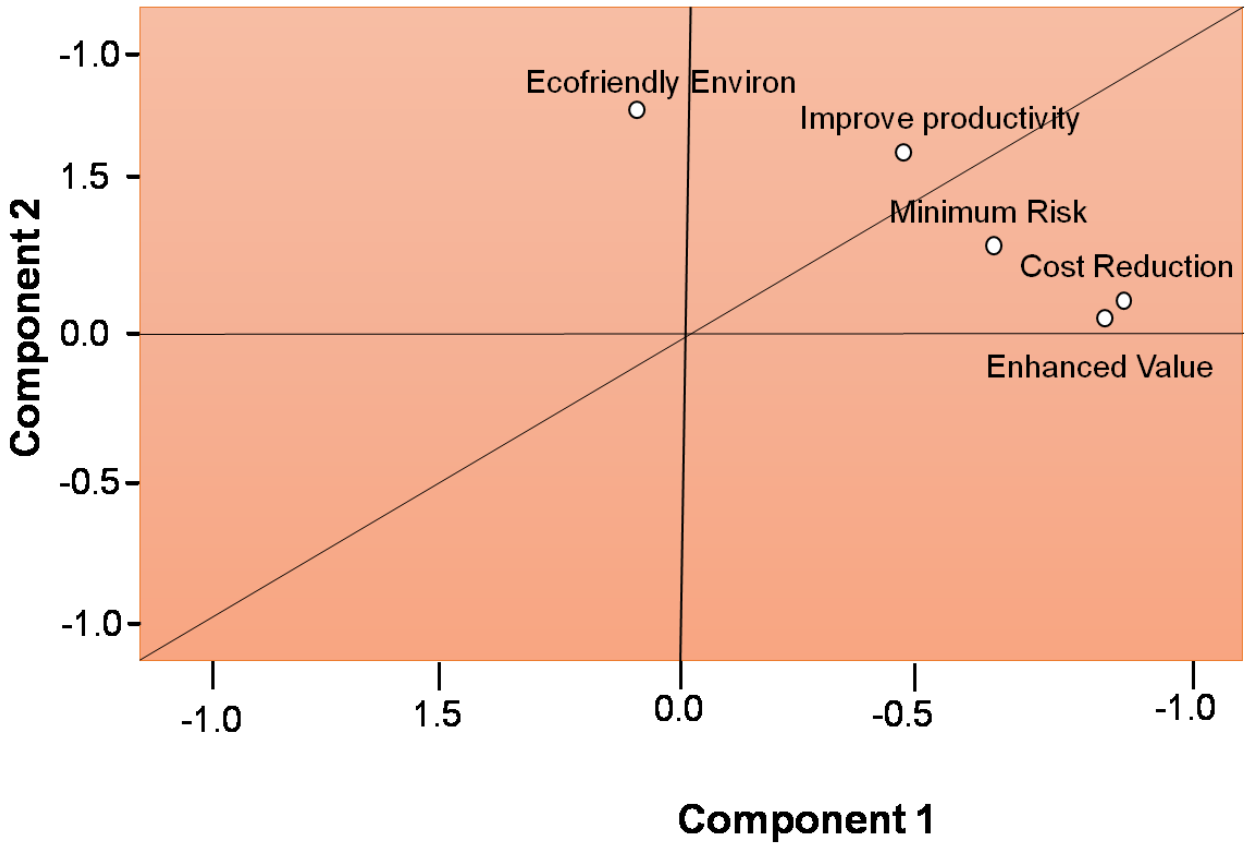

Figure 4.4

Rotated Space Factor Loading Component Plots

4.4.2 Objective 2: Effect of Sustainability Idea on Academic Achievement and Educational Facilities

T-Test Analysis was used to assess green characteristics that can enhance the learning environment and the downsides (side effects) of the absence of green features in a facility to ascertain the effect or influence the sustainability concept has on educational facility performance. The results are shown in Tables 4.5 and 4.6, respectively.

4.4.2.1 Green features that improve learning environments and facility performance

Table 4.5's 2-tailed significance values of 0.00, which met the necessary criterion of P0.05 level, were used to determine the significance of all eleven (11) green traits that the respondents had provided. The "natural illumination (daylighting)," "serene educational

environment," "less noise pollution," "less air pollution," and "natural ventilation" (indoor air), with mean differences of 4.84, 4.81, 4.79, and 4.70, respectively, are the most practical green features, according to the mean difference. The respondents once again demonstrated a lack of appropriate understanding of the green concept by assigning reduction in energy usage a low grade among other variable items, with a mean difference of 2.43. This conclusion, in particular, did not support "energy conservation" as a fundamental principle pertinent to ideology and the main factor in the widespread adoption of the sustainability idea.

4.4.2.2 Effects of Green Characteristic Absence on Academic Performance of Students and University Staff

To determine the extent to which the sustainability concept can facilitate or promote academic performance as well as create a valuable learning environment, it was critical to record the respondents' experiences regarding the potential effects of having insufficient or no green features in educational facilities. In this regard, a variety of sentences were developed in line with the potential causes of the absence of green attributes, and the results are displayed in Table 4.6. According to the observed results, all the variable items were validated by the respondents as being significant in terms of the negative impacts of lacking green qualities. So, the three variables with the highest mean differences are, in turn, "a noisy educational setting," "a lack of sufficient indoor air," and "inadequate natural illumination." A mean difference of 4.94, 4.92, and 4.92 exists between these three components. The absence of green attributes often reflects or depicts an educational facility's inability to sustain itself, as well as a massive performance gap, according to additional elements with substantial values.

Table 4.5

Green features that can improve learning environments and facility performance

Sample Test						
	Test value=0					
Variable items	T	df	Sig. (2-tailed)	Mean differece	95% confidence An interval of the difference	
					Lower	Upper
Natural ventilation	132.715	399	.000	4.963	3.61	4.77
Less air pollution	203.345	400	.011	4.754	4.71	4.81
Natural illumination	223.293	399	.000	4.875	4.85	4.93
Serene educational environment	152.703	399	.000	4.834	4.73	4.91
Less noise pollution	165.855	399	.000	4.815	4.77	4.85
Utilization of renewable energy	93.395	399	.000	3.552	3.45	3.62
Recycling of wastewater	55.645	399	.000	3.152	3.11	3.25
Serviceable building components and installations	166.315	399	.000	4.041	3.95	4.05
Use of non-toxic materials for construction	254.194	399	.000	3.965	3.93	4.00

Effective rainwater and erosion/flood control	184.145	399	.000	4.311	4.25	4.33

Table 4.6

Effects of Lack of Green Characteristics on University Instructors and Students

One sample Test						
Test value=0						
Variable items	T	df	Sig. (2-tailed)	Mean difference	The difference within a 95% confidence interval	
					Lower	Upper
The absence of sufficient indoor air could result in limited oxygen intake and restricted productivity	287.752	399	.000	4.915	4.84	4.93
The health of users in educational facilities is adversely affected by air pollution.	195.903	399	.000	4.806	4.75	4.74
Insufficient natural lighting could result in a reduction in the intended working or	352.038	399	.000	4.915	4.85	4.93

study hours and increase energy consumption by turning on lights constantly.						
Unstable academic endeavors and accomplishments are predicted by a rowdy learning environment.	302.096	399	.000	4.965	4.91	4.98
Noise pollution from power plants impairs productivity and lowers focus.	152.442	399	.000	4.752	4.71	4.85
Wastewater that is not recycled could drive up the price of producing portable water	88.521	399	.000	3.852	3.74	3.95
Energy usage and costs could rise if there aren't enough renewable energy sources.	95.183	399	.000	3.971	3.85	4.04
Environmental issues and flooding may result from ineffective rainfall management.	185.825	399	.000	4.811	4.74	4.85

Construction of non-biodegradable materials might be harmful to staff and students' health	185.175	399	.000	4.881	4.82	4.91

4.4.3 Obstacles to Green Management and Sustainable Facilities Development in the Indian Educational Sector

Adopting sustainable development and green management idea in developing countries like India raises several significant challenges, particularly when it comes to the construction of educational facilities. The perspectives of the respondents regarding obstacles to the adoption of sustainable facility development were looked at on this point. Table 4.7 analysis of 15 potential obstacles yielded the conclusion that every component is important. The lack of government intervention, lack of policy formulation and legislation, lack of sustainability concept teachings in school curricula, lack of cognate training on the sustainability concept for professionals in the building industry, lack of technical know-how, the foreignness of sustainable development and green management, and absence of a certified were further stated as the most significant barriers to sustainable development and green management. Although there was "no proven evidence of green benefits on the educational facility, lack of awareness or familiarity with the sustainability concept, lack of incentives, and insufficient allocation of funds from the federation also played significant roles, sustainability, and green management ideas were not widely adopted.

Table 4.7

The Green Management Concept and Obstacles to Sustainable Educational Facility Development

Sample Test						
Test value=0						
Variable items	T	df	Sig. (2-tailed)	Mean difference	95% confidence The interval of the difference	
					Lower	Upper
There is no concrete proof that green advantages accrued to sustainable educational facilities in the nation.	181.896	399	.000	4.967	4.35	4.20
Due to the low benefits of green features, sustainable facilities are expensive to build.	40.741	399	.000	4.342	1.85	2.05
Concern that users may misuse and exploit sustainable facilities and installations	53.961	399	.000	1.873	1.85	1.93
Lack of knowledge or experience with the	155.213	399	.000	4.241	4.15	4.35

ideas of sustainability and green management						
Lack of architectural aesthetic in sustainable educational facility	90.104	399	.000	2.855	3.74	3.91
A sustainable educational facility's delayed construction and instructional period	91.856	399	.000	2.785	2.74	2.88
Lack of technical ability to complete the building, upkeep, and green management of a sustainable facility	255.843	399	.000	4.835	4.81	4.89
Green management and the creation of sustainable infrastructure are unfamiliar concepts.	204.481	399	.000	4.702	4.45	4.78
A lack of financial incentives for environmentally friendly facility development	163.484	399	.000	4.191	4.15	4.25
The federation has not	177.635	399	.000	4.124	4.07	4.15

allocated enough money to support the construction of sustainable facilities						
Government interventions are lacking for the construction of long-lasting institutions in the educational sector.	442.102	399	.000	4.945	4.91	4.96
There are no established laws or policies that can promote the construction of sustainable educational facilities.	405.443	399	.000	4.932	4.93	4.95
Lack of a professional training program for the built environment	261.193	399	.000	4.834	4.85	4.89
Lack of a certification and rating organization that may honor educational institutions	121.215	399	.000	4.685	4.53	4.65
The educational	273.426	399	.000	4.853	4.81	4.86

curricula of higher institutions do not adequately educate sustainable development and green management						

4.4.4 Research Hypotheses:

H_{01}: In India, the performance of educational facilities is significantly influenced by the sustainable notion.

Table 4.6

In India, a Pearson Product Moment Correlation demonstrates a link between the concept of sustainability and academic facility performance

Variables	Mean	S.D	N	R	P	Remark
Educational Facility Performance	28.12	4.281	400	.137**	.004	Sig
Sustainable Concept	46.00	2.075				

The finding in Table 4.7 supports the hypothesis that the sustainable concept significantly affects educational facility performance in India ($r = .140, N = 401, p < 0.49$). At a 0.05 level, the aforementioned result is significant. This suggests that if the sustainability

idea is applied to infrastructural development in the Indian educational sector, it can have a favorable impact on facility performance.

H_{02}: In India, the performance of educational facilities is significantly impacted by green management.

Table 4.8

In India, a Pearson Product Moment Correlation discovered a link between green management and academic facility performance

Variables	Mean	S.D	N	R	P	Remark
Educational Facility performance	28.12	4.281	400	.561**	.000	Sig
Green management concept	150.62	5.229				

The analysis's results, which are presented in Table 4.8, show that green management has a significant impact on educational facility performance in India with a precise P-value of 0.000, or significant at the level of 0.05. However, it should be noted that green management cannot be executed as a follow-up plan without accepting the sustainability concept. Because of this, regression analysis was used to integrate the prediction of both projects to examine the third hypothesis (Ho3).

H_{03}: The sustainable idea and green management work together to improve educational facility performance in India

The combined effects of the sustainable concept and green management on the effectiveness of educational facilities in India are shown in Table 4.9. Also, the table

displays a multiple R square of 0.632 and a multiple correlation coefficient (R) of 0.566. This shows that the independent factors account for 53.1% (Adj. R2=0.429) of the variance in the performance of the educational facility when taken as a whole. The significance of the composite contribution at p 0.05 was calculated using the F- ratio at the degree of freedom (df- 1/298). The table also showed an F-ratio of 94.479 from the regression's analysis of variance. The aforementioned analysis is significant at a 0.05 level. It reveals that the combination of both predictors has a significant impact on the topic given the desired or anticipated consequence that could lead to the improvement of the educational infrastructure in India (i.e., educational facility performance).

H_{04}: The performance of educational facilities in India is not impacted by the sustainable idea and green management taken together.

Table 4.9

Regression analyses are utilized to analyze how a sustainable notion and green management will affect educational institutions' performance in India

.R	R Square	Adjusted R Square			Std. Error of the Esimate	
1.556	0.631	0.530			3.541	
Summary Regression ANOVA						
	Sum of Squares	Df	Mean Square	F	P	Remark
Residual	4973.371	395	11.531			
Regression	2341.003	2	1170.501	93.475	0.000	Sig.
Total	7215.374	398				

Table 4.10

Evaluation of the Importance of the Regression Coefficients: Relative Contribution of the Independent Variables to the Dependent Variable

Variable	Unstandardized Coefficients		Standardized coefficients			
Model	(B)	Std.Error	Beta (β)	t	Sig	Remark
Constant	33.340	5.961	-	3.912	.000	-
Green Management	.451	.033	.553	13.251	.000	Sig.
Sustainable Concept	.112	.084	.534	1.281	.000	Sig.

The independent factors have a big impact on the dependent variable, as indicated by the beta weights in Table 4.10. According to the correlation coefficients between green management and the sustainable concept and the dependent variable (performance of educational facilities), green management (β = 0.555, t = 13.254, p <0.05) is the major factor in the prediction, followed by the sustainable concept (β = 0.537, t = 1.282, p <0.05). This suggests that the independent factors (green management and sustainable philosophy) have a considerable influence on the dependent variable (performance of educational facilities in India). But, it is also reasonable to conclude that proactive green management as an operational concept would enhance the foundation of the widely accepted sustainable philosophy. Simply expressed, combining the two concepts rather than putting them into practice in opposition will greatly enhance the efficiency of future educational facilities and the advantages of becoming green.

4.5 Conclusion

This chapter discusses that each stakeholder (policymakers, building experts, environmentalists, facility users, etc.) has a significant role to play in removing barriers, launching ideas, and achieving desired performance. In the plan to achieve a significant turnaround in the education sector, the contribution of anticipated green features to boosting staff productivity and academic achievement cannot be overemphasized or ignored. Amazingly, despite the poor state of educational infrastructure, which has been a hindrance to academic brilliance, the rate of developing concern for excellent education is strong, particularly in the southern region of India.

CHAPTER V: DISCUSSION

5.1 Discussion of Results

The analyses and discussions on respondents' perceptions of sustainability and green management concepts that have gone before have highlighted and resolved some important problems about policymakers' appropriation or adoption of endearing concepts who may be looking for improved educational facility performance and a better learning environment. Hence, to make sustainability development and management simple to implement, the following suggestions are essential:

1. Enhancing facility value and performance and creating an "eco-friendly educational environment" are the two fundamental elements that are exciting and capable of inspiring sustainability and green management concepts. To attract the attention of potential users of green facilities in India's educational sector, all the variable items that made up these two criteria must be given enough precedence among other items of excluded components;
2. The readiness of respondents to increase productivity and achieve academic excellence upon the availability of sustainable facilities also demonstrated the impact of green features on the enhancement of educational facility performance. To do this, the perception analysis identified a "loud learning environment," "lack of proper indoor air," and "inadequate natural illumination" as the main elements that could affect facility performance, among other things. To increase the likelihood of achieving the desired result, it is crucial to identify and combine these aspects from the design stage through the building phase of sustainable facility development, and finally to its operational level through hands-on green management (s).

3. The analyses noted that "lack of government intervention," "unavailability of policy formulation and legislation," "lack of sustainability concept teachings in the school curricula," "unavailability of capacity training for the professional in the building industry," "lack of technical know-how on construction and maintenance sustainable facility," and "foreignness of sustainable concepts" were among the obstacles to adopting sustainability and green management concepts. Hence, the federal government should make the necessary efforts in the area of developing and implementing green policies, including concept advocacy and essential financial assistance for the educational sector to guide the development of sustainable facilities. Similarly to this, institutions of higher education must revise their course offerings to provide room for student training in sustainable development and environmental management in general. This will in some way increase familiarity and spread the word about the idea of being green. All professionals working in the construction sector and environmental management must increase their knowledge of, and capacity for, sustainable development and green management.

CHAPTER VI:

SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

6.1 Summary

The concept of Sustainable Development emerged with the Brundtland Commission (1987), which specifies that it is "the development which meets the \ demands of the present without compromising the ability of future generations to \ meets their own needs". The goal of Education for Sustainable Development (ESD) is to create a society that integrates the social, political, economic, and environmental spheres. As we examine how ESD has developed, we can see that Environmental Education was the initial endeavor, then Sustainable Development, and finally Education for Sustainable Development (ESD), which strives for a sustainable future.

The notion that economic, social, political, and environmental factors all play a significant influence is one of the fundamental tenets of sustainable development. It is impossible to maintain a better society, which is necessary for both us and the next generation, without a healthy ecosystem. Hence, the environmental dimension might be seen as the outer limit of sustainable growth. The social dimension must provide for everyone's fundamental requirements while staying within ecological limits.

The goal can be achieved through the economic dimension, as long as it is done in a way that is socially and environmentally sustainable. Hence, education for sustainable

development (ESD) cannot be seen as having a connection with the environment alone but also with the development of social and economic factors.

Global warming, ozone depletion, biodiversity loss, pollution, deforestation, and loss of biodiversity are just a few of the environmental issues the world is currently dealing with. From where did they originate? The environment provides all the essential resources needed to sustain life. The environment is what provides food for humans, fuel for transportation, raw materials for industry, etc. The garbage that is produced by developmental activity is also absorbed by the environment. The environment's health and well-being are influenced by how humans interact with it. Environmental deterioration results from the excessive exploitation of environmental resources. This abuse and/or mismanagement of our natural resources has given rise to many of today's environmental 224 issues. The well-being of people is impacted by all of these issues.

Understanding and appreciating the connections between environmental well-being and human well-being will be necessary for both resolving present environmental issues and preventing the emergence of new ones. Many of these connections, meanwhile, are not immediately clear. Education is essential to bringing environmental and development issues to the public's attention, enabling them to comprehend the connections between the two, motivating them to take the right action, and providing them with the skills needed to carry out that action.

6.2 Implications

1. Since the intervention program's usefulness has been proven, teachers can use it in the classroom to promote sustainability, and they can even try to incorporate ESD concepts into the existing curriculum where it is feasible.
2. The goal of curriculum uniformity is to address sustainability, therefore policymakers may try to incorporate ESD into all academic topics.

3. To create a sustainable society, ESD can be incorporated into the entire curriculum at all educational levels.
4. ESD curricular integration will aid in the development of knowledge, critical thinking, and problem-solving skills toward sustainable development. Since ESD deals with economic, social, and environmental issues, it may be incorporated into the curriculum, which is what's required right now.
5. Integrating ESD and effectively utilizing it helps to improve abilities relevant to sustainable development.
6. While integrating ESD into the curriculum, local needs may be taken into consideration. As a result, resources may be spent wisely while keeping future demands in mind.
7. To provide teachers with the necessary information, abilities, attitudes, and values about SD as well as with the proper pedagogical and assessment procedures to conduct ESD in schools in an integrated manner, ESD can be incorporated into pre-service and in-service programs.
8. To ESD, environmental education may be included.
9. Incorporating ESD can help maintain biodiversity, reduce pollution, and promote sustainable agriculture, among other things.
10. ESD integration promotes eco-friendly living.

6.3 Recommendations for Future Research

1. To determine the efficacy of an integrated strategy to ESD, a similar study can be conducted for elementary, secondary, and upper secondary levels.
2. Comparable research can be done at the graduate and post-graduate levels as well as in professional institutions like those for engineering, medicine, teacher training, etc.

3. Since ESD is a growing trend and there have been numerous studies on attitudes toward environmental education, research can be done to understand these attitudes.
4. Research can be conducted to determine how teachers and students feel about ESD and what those values are.
5. It is possible to conduct studies to learn more in-depth about the values associated with ESD and how to change one's values.
6. Several factors that might predict critical thinking, problem-solving, and ESD values can be uncovered through research.
7. Research can be conducted in specialized fields like biodiversity preservation and water management.
8. ESD can be studied alongside courses including English, regional languages, the arts, math, and more.
9. To find out how many various stakeholders are knowledgeable about ESD, a survey can be undertaken.
10. Research can be conducted to analyze different case studies that have creative approaches to managing water resources, saving energy, conserving forests, etc.
11. Creating a compost pit and collecting rainwater are two examples of innovative sustainable development strategies that might be implemented in other institutions.
12. To investigate the level of ESD knowledge across various populations, surveys can be conducted.
13. To learn more about the native ways that different tribe communities practice sustainability, ethnographic studies can be conducted.

6.4 Conclusion

The research investigates perspectives on sustainability and green management as key ideas for improving educational facility performance. The results of tested hypotheses specifically pointed to these concepts as workable remedies for uncomfortable facility situations. However, it was noted that because of some of the previously mentioned obstacles, the adoption of sustainability and green management for the development of educational facilities is not evident in India. To remove barriers, start a concept, and achieve a desired performance, it is thought that all stakeholders (policy-makers, building professionals, environmentalists, facility users, etc.) have important roles to play on an individual level. In the plan to achieve a significant turnaround in the education sector, the contribution of anticipated green features to boosting staff productivity and academic achievement cannot be overemphasized or ignored. Surprisingly, despite the poor condition of educational infrastructure, which has been a hindrance to academic excellence, the speed of developing concern for quality education is high, particularly in the southern region of India. It is clear that Indian scholars are succeeding exceptionally well, even when taking into account the diasporas, at the intersection of excellent facilities; consequently, it is time to adopt sustainable education facility development to duplicate this achievement and enable Indian universities to be ranked among the top hundred in the world. Therefore, the stakeholders must immediately recognize the need for a paradigm shift, curtail any potential deviations or implementation stagnations, and embrace the ideas of sustainability and green management as the proven solution to the global threat posed by the traditional method of building physical and socioeconomic infrastructure.

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