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Educational Ecosystems for Sustainable Development: Developing Country Perspective

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Abstract
This research paper examines the implementation of Education for Sustainable Development (ESD) in Bangladesh by focusing on the sustainable entrepreneurship principles and the strategic pathways necessary for integrating ESD into the educational ecosystem through a qualitative study. It emphasizes the significance of aligning initiatives with both national and global sustainability goals to promote overall development and tackle urgent socio-economic and environmental issues. Through a comprehensive analysis, the paper highlights the critical role of policy support, transforming the learning environment, capacity building of educators, and community engagement in advancing ESD. Key findings reveal that effective ESD implementation requires robust policy integration, curriculum alignment, teacher development, and strategic resource allocation. The research identifies significant challenges which include limited budget allocation, stakeholder interest, and awareness about sustainability. Recommendations involve updating guidelines, boosting financial support, and cultivating collaborations to encourage the teaching of sustainability. The research provides significant perspectives on sustainable education, policy execution, transformational leadership, and communal growth, providing a blueprint for progressing ESD in Bangladesh and comparable settings. Subsequent studies should delve into the lasting effects of ESD programs and examine comparative analyses among various developing nations to enrich the worldwide comprehension of successful approaches for advancing sustainability education.

Keywords: Education for Sustainable Development (ESD), Sustainable Entrepreneurship, Educational Ecosystem, Strategic Pathways, Sustainable Development Goals (SDGs).

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1. Introduction

In recent decades, sustainable development and sustainable entrepreneurship have gained increasing recognition as a fundamental framework for addressing pressing global challenges like environmental conservation, social equity, and economic prosperity (IPCC,2007). Within this context, education emerges as a pivotal catalyst for fostering transformative change and nurturing a generation of individuals to tackle sustainability issues effectively (Poeck et. al,2012). Educators can play the role of a sustainable entrepreneur by taking initiatives that integrate sustainability into their teaching practices, curriculum design, and learning experiences that emphasize environmental stewardship, social responsibility, and economic viability. By instilling values of sustainability in students, educators not only empower them with knowledge but also cultivate a mindset geared towards sustainable innovation.

As a developing country, Bangladesh faces numerous socio-economic and environmental challenges. These challenges include environmental degradation, resource depletion, poverty, and social inequality. At the same time, the economy of Bangladesh has grown rapidly maintaining a GDP growth rate of around 7% for the last decade and it has a vision of becoming a middle-income country by 2030 and a developed country by 2041(General Economics Division, 2020). Furthermore, rapid industrialization, urbanization, and population growth place tremendous pressure on natural ecosystems. In such a context, the development of sustainable educational ecosystems by implementing UNESCO's Education for Sustainable Development (ESD) framework holds immense potential for fostering sustainable practices and driving holistic development which is needed for economic, social, and environmental prosperity by cultivating sustainable values, knowledge, and skill. This educational approach raises awareness and cultivates a mindset that values long-term environmental and social goals over short-term profits which perfectly aligns with sustainable entrepreneurship principles (Sterling, 2010). Furthermore, ESD supports local development through community-based learning and projects, enabling local entrepreneurs to identify local needs and create businesses that provide sustainable solutions. Moreover, the support systems and policies associated with implementing ESD can also be advantageous, for entrepreneurship. Government and institutional backing for ESD often includes subsidies, grants, and favorable regulations that can benefit businesses. Additionally, ESD programs help create networks among educators, businesses, and policymakers encouraging collaboration and sharing of resources that are beneficial for entrepreneurship (Tilbury, 2011). In Bangladesh integrating ESD can tackle challenges such as the impacts of climate change and poverty. It can utilize resources to develop a workforce educated in sustainability leading to the creation of jobs and sustainable enterprises (Uddin, 2023).

ESD encompasses pathways like advancing policies at the governmental level transforming learning environments enhancing educator capabilities mobilizing youth participation and taking action at the local level (UNESCO, 2020). Despite the increasing acknowledgment of the significance of education educational institutions in Bangladesh lack a focus on sustainability. The content of curricula often lacks the integration of ESD principles and institutional infrastructure is insufficient to support sustainability initiatives. However

numerous studies have proposed a variety of approaches to establish education in Bangladesh. Shamsuddoha (2005) highlights the necessity for universities to include education on development in their curricula while Shohel (2010) suggests that nonformal education can play a role, in this endeavor. Salequzzaman (2001) proposes the establishment of an environmental education initiative to enhance understanding and foster the growth of development. Ahmmed (2014) recommends implementing inclusive education in primary schools. Finally, Mujeri (2010) advocates for a rights-based approach to education, prioritizing participation, accountability, and non-discrimination. These strategies, if implemented effectively, could contribute to the establishment of sustainable education in Bangladesh. The impact of this will result in sustainable and holistic growth reducing the threat of economic recession, and environmental disaster in the future.

Though these strategies are well recognized, there is a lack of empirical studies examining their practical implementation within the context of Bangladesh's educational ecosystem. Implementing these strategies is very challenging because of resource constraints, cultural diversity, and institutional capacity (Salequzzaman et. al, 2016). For these reasons, it requires a focused investigation into the implementation mechanisms of these strategic pathways for achieving sustainable education goals in the country. So, from the existing research gap, we derive the following research question:

*How can strategic pathways towards establishing Education for Sustainable Development (ESD) be implemented in a developing country such as Bangladesh***?**

Implementing these strategic pathways towards ESD in Bangladesh directly fosters sustainable entrepreneurship by establishing a knowledge base, values, and skills that promote sustainability. This integration can generate entrepreneurs capable of addressing unique local challenges and opportunities, thereby driving sustainable development. Furthermore, the aims and objectives of the research are twofold. For academic and theoretical contribution the research aims to fill the research gap by analyzing and identifying effective strategies for implementing ESD through strategic pathways in Bangladesh by investigating the challenges and opportunities associated with it. In addition, for practical implementation, the research will make recommendations for policymakers, educators, and stakeholders on effective strategies to implement ESD in the Bangladeshi educational ecosystem and similar contexts.

The next chapter of this research paper is the theory section which discusses the concept of Education for Sustainable Development (ESD), the Educational ecosystem, and other relevant theories that lead to developing a theoretical framework for implementing ESD. Then the third chapter is the methods and data chapter which outlines the research design, data collection, and analysis with code, themes, and aggregated dimensions. The fourth chapter is the findings chapter which presents the results, focusing on the implementation of ESD through policy integration and prioritization, as well as community engagement. This section underscores the importance of collaboration between educational institutions and governmental bodies to align policies with international standards and national development goals. Then the last chapter is the discussion and conclusions which synthesize these insights, offering recommendations for

policymakers, educators, and stakeholders to enhance the effectiveness of ESD initiatives in Bangladesh and end up with limitations and possibilities of future research.

2. Theory

2.1. Education for Sustainable Development(ESD)

Education for Sustainable Development (ESD) has emerged as a crucial paradigm in addressing the multifaceted challenges of the 21st century, including economic instability, climate change, and social inequities. The Council of the European Union (2010) emphasizes the indispensable role of ESD in fostering sustainable development through lifelong learning, highlighting its integration into all levels and aspects of education and training. This theoretical framework explores the foundational principles, pedagogical approaches, and strategic implementations of ESD, providing a comprehensive basis for empirical research.

Theoretical foundations of ESD

The report, from the Sustainable Development Education Panel in 1998 defines Education for Sustainable Development (ESD) as the learning needed to maintain and enhance our quality of life as well as that of future generations. ESD empowers individuals to acquire the knowledge, values, and skills essential for participating in decisions on collective actions, both locally and globally to enhance people's well-being now while safeguarding the planet for generations to come.

The core idea of development involves integrating growth, social equality, and environmental conservation as articulated in the EU Sustainable Development Strategy (Council of the European Union, 2010). ESD strives to equip people with the knowledge, skills, and attitudes to contribute towards a future. It underscores thinking, problem-solving abilities, creativity, decision-making skills, and other essential competencies to address global challenges (European Parliament and Council 2006). ESD encompasses approaches that promote these skills while highlighting the interconnectedness of social, economic, and environmental concerns (Tilbury et al., 2002).

The United Nations Decade of Education for Sustainable Development 2005 to 2014 underscores the commitment to integrating development principles into education (UNESCO, 2009). This project showcases how ESD can play a role in promoting a mindset through values-based learning approaches. The impact of climate change, reducing poverty, and environmentally friendly consumption are the key sustainable development issues that must be addressed in learning. It also necessitates active learning methods that motivate students to change their behavior and take action toward sustainable development. Through this process, it promotes skills such as thinking strategically and making mutually beneficial decisions. Overall, ESD necessitates significant changes in education and how it is practiced today (UNESCO, 2014)

In 2019, UNESCO initiated ESD Roadmap 2030. This roadmap is a global framework designed to accelerate the integration of sustainability into educational systems, aligning with the goals of SDGs for the decade 2020 to 2030. Lessons from the Global Action Programme (GAP) 2015-2019 on ESD emphasize the transformative potential of education in fostering sustainability through individual action and societal change. It focuses on the ability to address deep structural causes of unsustainable development, such as economic and social inequities. Furthermore, ESD for 2030 addresses the opportunities and challenges posed by technological advancements. Achieving the transformative change required disrupting the status quo and fostering a culture of courage, persistence, and ethical responsibility. By reorienting education at all levels to promote sustainable development, ESD for 2030 aims to contribute significantly to the achievement of the SDGs(UNESCO, 2019).

Pedagogical approaches to ESD

ESD promotes an interdisciplinary approach to education, moving beyond traditional boundaries to encompass a wide range of skills and competencies. It advocates for engaging all stakeholders such as students, educators, parents, and the community in the learning process (Council of the European Union, 2010). This approach ensures that sustainable practices are not only taught but also modeled within educational institutions. By definition, Key pedagogical strategies for ESD include experiential learning, systems thinking, and participatory learning. Experiential learning involves hands-on activities that connect theoretical knowledge with real-world applications (Kolb, 1984). Systems thinking encourages learners to recognize the interconnectedness of social, economic, and environmental systems (Sterling, 2001). Participatory learning emphasizes collaboration and empowering learners to take ownership of their educational experiences and outcomes (Fien, 2001).

Strategic implementation of ESD

In order to successfully apply ESD it is essential to have policies, regulations, and structures that provide support. The European Union Council emphasizes the importance of incorporating ESD into learning plans educational curricula and teacher training initiatives (European Union Council, 2010). This incorporation guarantees that ESD values are ingrained throughout levels and fields of study fostering a sustainable mindset both, in and, outside the classroom.

Bangladesh's context, incorporating sustainability in policies, creating a learning environment, capacity building of the educator, and community empowerment are the most important strategies of ESG (Salequzzaman et. al., 2016). Advancing policy for ESD involves proactive efforts to develop and implement policies that support global sustainable development. It emphasizes engaging policy-makers, scaling up ESD across diverse settings, fostering cross-sectoral collaboration, and aligning with SDGs. Transforming learning environments involves reimagining and reshaping educational settings to empower learners as sustainable change agents (UNESCO, 2020). It requires aligning institutions with sustainable principles, integrating sustainability themes into the curriculum and facilities management and decision-making, adopting a holistic approach to ESD, and creating environments that seamlessly blend learning with daily life (Sterling, 2011). Capacity building of educators with the necessary skills to integrate sustainability into their teaching practices is another key strategy that requires

continuous professional development of teachers from higher education to elementary education(UNESCO, 2012). Finally, Engaging communities as partners in education enhances the relevance of sustainability initiatives. This requires the involvement of the community in decision-making regarding sustainability to foster ownership and support (UNESCO Office in Kathmandu, 2006).

2.2. Educational Ecosystem

To implement the principles of ESD it is very important to have an Educational Ecosystem with different stakeholders. It encompasses formal and informal learning environments, including schools, communities, families, government agencies, non-profit organizations, digital platforms, etc. The concept of an educational ecosystem highlights the complex and dynamic nature of education, recognizing the diverse actors and factors that shape the learning experiences and outcomes of learners (UNESCO, 2019). In the context of Bangladesh, the educational ecosystem comprises stakeholders like schools, colleges, universities, the Ministry of Education, the Directorate of Secondary and Higher Education, the National Curriculum and Textbook Board(NCTB), etc. All these key stakeholders can collaborate to implement the strategic pathways for Education for Sustainable Development which is crucial for the sustainable development of Bangladesh(Salequzzaman et. al., 2003).

2.3. Governmental policies of Bangladesh and ESD implementation

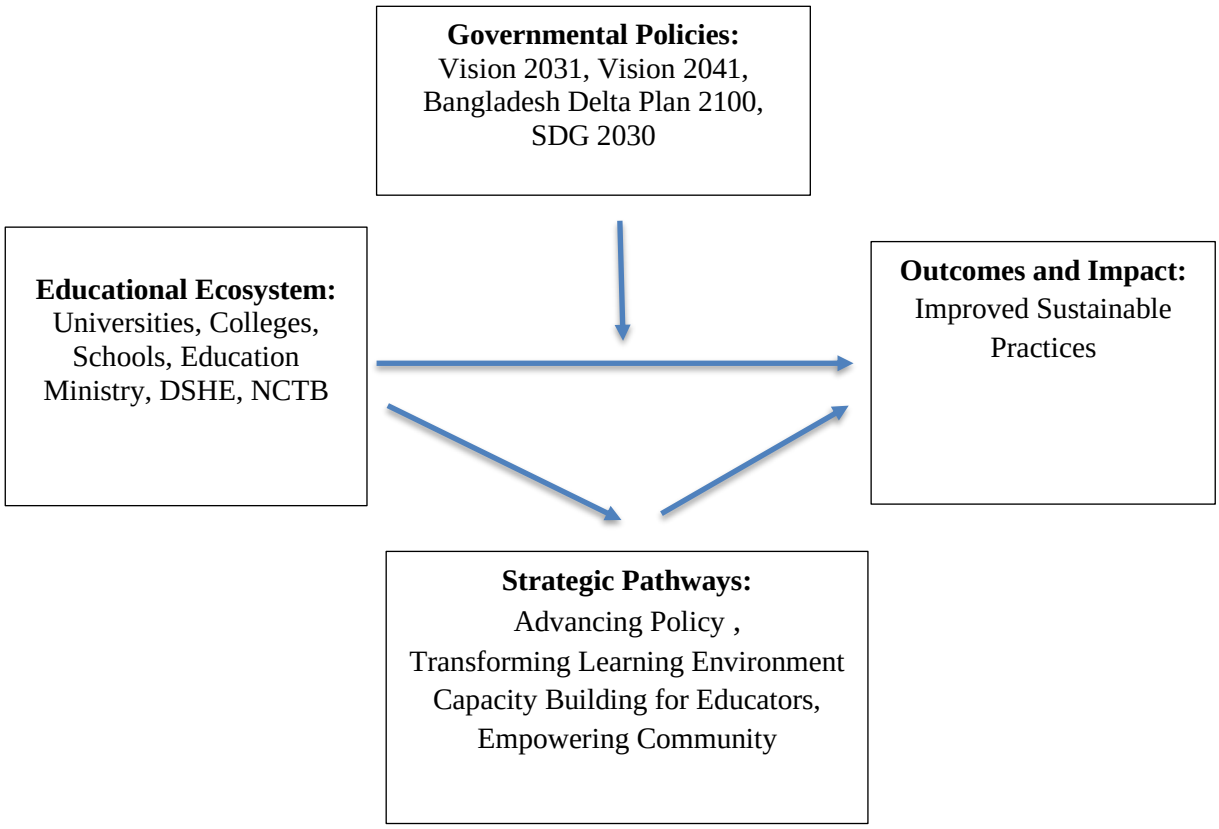
The Government of Bangladesh has outlined long-term strategies such, as Vision 2031 and Vision 2041 to elevate the country to a middle-income status by 2031 and a developed nation by 2041. These visions prioritize growth, human development, and social advancement. Vision 2031 focuses on enhancing the quality and availability of education while Vision 2041 aims to establish a knowledge-based economy (General Economics Division, 2020). Additionally, The Bangladesh Delta Plan 2100 (BDP 2100) is an endeavor aimed at ensuring development and climate resilience through integrated water resource management. This plan emphasizes the importance of education and capacity building in water resource management and climate change adaptation (General Economics Division, 2018). Furthermore, the Sustainable Development Goals (SDGs) 2030 represent an agenda embraced by all United Nations member states, including Bangladesh to eradicate poverty, safeguard the environment and promote prosperity. SDG 4 specifically targets enhancing education quality by fostering learning opportunities and ensuring access for everyone (United Nations, 2015). To achieve these long-term goals, we need to integrate the principles of ESD. These policies collectively provide a framework for promoting sustainable education.. By aligning national educational strategies with these governmental policies, Bangladesh can develop strategies to implement ESD effectively. This alignment ensures that educational reforms are coherent with broader developmental and sustainability goals, fostering a generation equipped with the knowledge and skills necessary for sustainable development.

2.4. Theoretical framework

The theoretical framework for implementing ESD through strategic pathways was derived by synthesizing key elements from existing governmental policies, the educational ecosystem, and strategic initiatives to foster sustainability. This framework integrates insights from policy

documents such as Vision 2031, Vision 2041, Delta Plan 2100, and the Sustainable Development Goals (SDG) 2030, emphasizing aligning educational efforts with national and global sustainability objectives. By incorporating these diverse elements, the framework aims to create a comprehensive approach that addresses policy advancement, academic transformation, capacity building, and community empowerment.

Figure 1: Theoretical Framework for implementing ESD through strategic pathways



This framework comprises some key features. One notable feature is the governmental policies which include long-term plans such as Vision 2041, Delta Plan 2100, and SDG 2030. These policies set a direction and long-term vision for how incorporating ESD can be beneficial for national development goals. Another feature is the educational ecosystem, which comprises universities, colleges, schools, the Ministry of Education, the Directorate of Secondary and Higher Education (DSHE), and the National Curriculum and Textbook Board (NCTB). This educational ecosystem plays a role in promoting ESD by ensuring that educational institutions and curricula are in line with sustainable development principles. The third key element includes pathways like advancing policy, transforming learning environments, building educators' capacities, and engaging communities. These pathways are crucial for implementing ESD by ensuring that educational policies align with sustainability objectives; creating learning environments conducive to sustainability education; equipping educators with the necessary skills to teach sustainability in their courses; and involving communities, in sustainability

efforts. Ultimately the goal of this framework is to enhance practices that contribute to sustainable development by integrating ESD into the educational ecosystem through strategic pathways supported by robust governmental policies. This framework guarantees that every essential aspect required for the implementation of ESD is taken into account and it demonstrates a straightforward path to accomplishing sustainable development objectives via education, in Bangladesh. The next chapter of the paper will examine the framework in more detail based on the answers of the interviewees.

3. Methods and Data

3.1 Research design

This research began with an extensive literature review to identify existing strategies and pathways proposed for implementing ESD in developing countries, particularly focusing on Bangladesh. A research design is a blueprint of how a study will be conducted, including methods, data collection, and analysis, ensuring the reliability and validity of the findings(Akhtar et. al, 2016). This phase involves gathering and analyzing academic papers, reports, policy documents, and relevant literature to establish a theoretical framework and contextual understanding of the topic. Then a qualitative research method will be employed to explore and understand the implementation of strategic pathways for ESD in Bangladesh. Qualitative research captures lived experiences using methods like interviews and observations. It focuses on understanding rather than quantification, with the researcher as the primary instrument with challenges like conceptualization and execution of findings (Awasthy, 2019). It is therefore the most relevant method to answer the research questions. In this research, an abductive approach will allow for an in-depth exploration of the complexities of the topic, including challenges and opportunities associated with implementing ESD theory in Bangladesh.

3.2 Data collection

For data collection of this research semi-structured interviews were conducted. Semi-structured interviews are flexible conversations focusing on specific themes. Unlike formal interviews, they allow for the exploration of motivations and attitudes, providing valuable insights into people's lives and experiences (Adams, 2015). Therefore, semi-structured interviews are conducted with representatives from the Universities, Colleges, Ministry of Education, Directorate of Secondary and Higher Education (DSHE) which is a Bangladesh government Directorate responsible for enhancing education quality and access to education. These interviews explore perspectives, experiences, challenges, and opportunities related to ESD implementation. Table 1 presents a detailed description of the participants and the duration of the interviews.

Table 1: List of interviews

	Organization	Position	Duration of Interview
1	Jahangirnagar University	Assistant Professor	00:35:10 Minutes
2	Ministry of Education	Project Manager	00:34:03 Minutes
3	Bhawal Badre Alam Govt. College	Lecturer	00:23:40 Minutes
4	Bangabandhu Sheikh Mujibur Rahman Science and Technology University	Assistant Professor	00:39:04 Minutes
5	Government Titumir College, affiliated with Dhaka University	Lecturer	00:35:10 Minutes
6	Directorate of Secondary and Higher Education(DSHE)	Attachment Officer	01:03:42 Minutes
7	Government Bangabandhu College	Lecturer	00:33:18 Minutes

All 7 interviews were conducted online between April and May 2024. They were all recorded and then transcribed. The average duration of an interview is approximately 38 minutes with a minimum of 24 minutes and a maximum of 63 minutes. To avoid confirmation bias, system reasoning, or over-consciousness the interviews were conducted via Google Meet video call by me as a researcher and representatives from educational and administrative institutions of Bangladesh (Gudmundsson et. al., 2013). The primary advantage of these private interviews is that they involve direct interaction between researchers and participants, which eliminates non-response rates. After getting written consent from the respondents, all the interviews were conducted. All participants were free to withdraw from the study at any time, and for ethical and confidentiality reasons, they were only identified by their job title. Several questions have been prepared to ensure the interview is in line with the research objective. These questions concentrate on the respondent's duties, the organization, and the role in promoting sustainable education. This is expected to end in a relatively accessible structure with plenty of room for future development, as well as an accurate database that takes into account various perspectives (Gudmundsson et. al., 2013). The goal of this study is to gather and obtain relevant and high-quality information, rather than just a large quantity. It is based on the idea of theoretical sampling. This method has been defined by systematic investigation and simultaneous assessment of the content. (Götzö, 2014)). According to theoretical sampling, data collection and evaluation are related processes rather than separate ones (Clarke, 2012). The goal is not only to make a wide range of information available but also to establish a research framework in which comprehensive data on the material can be obtained (Clarke, 2012).

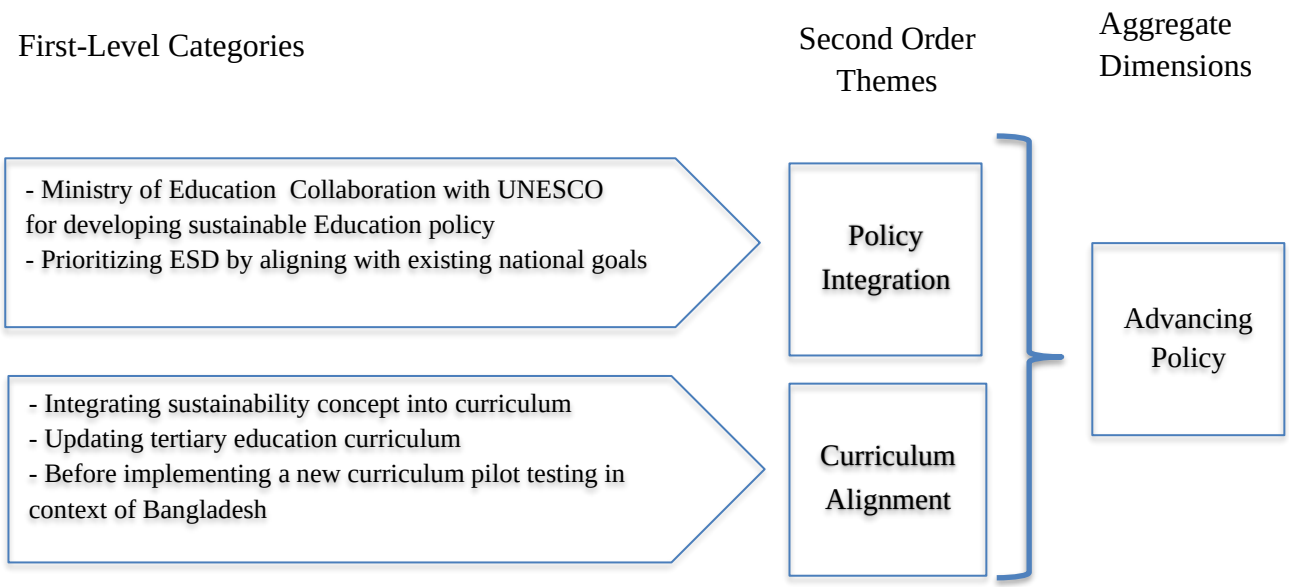
Each interviewee in the study plays a crucial role in elucidating different aspects of the research question regarding the implementation of strategic pathways for Education for Sustainable Development (ESD) in Bangladesh. Educators from various educational institutions, provide frontline insights into the challenges and opportunities for integrating sustainability concepts into the curriculum and transforming learning environments. Their perspectives are

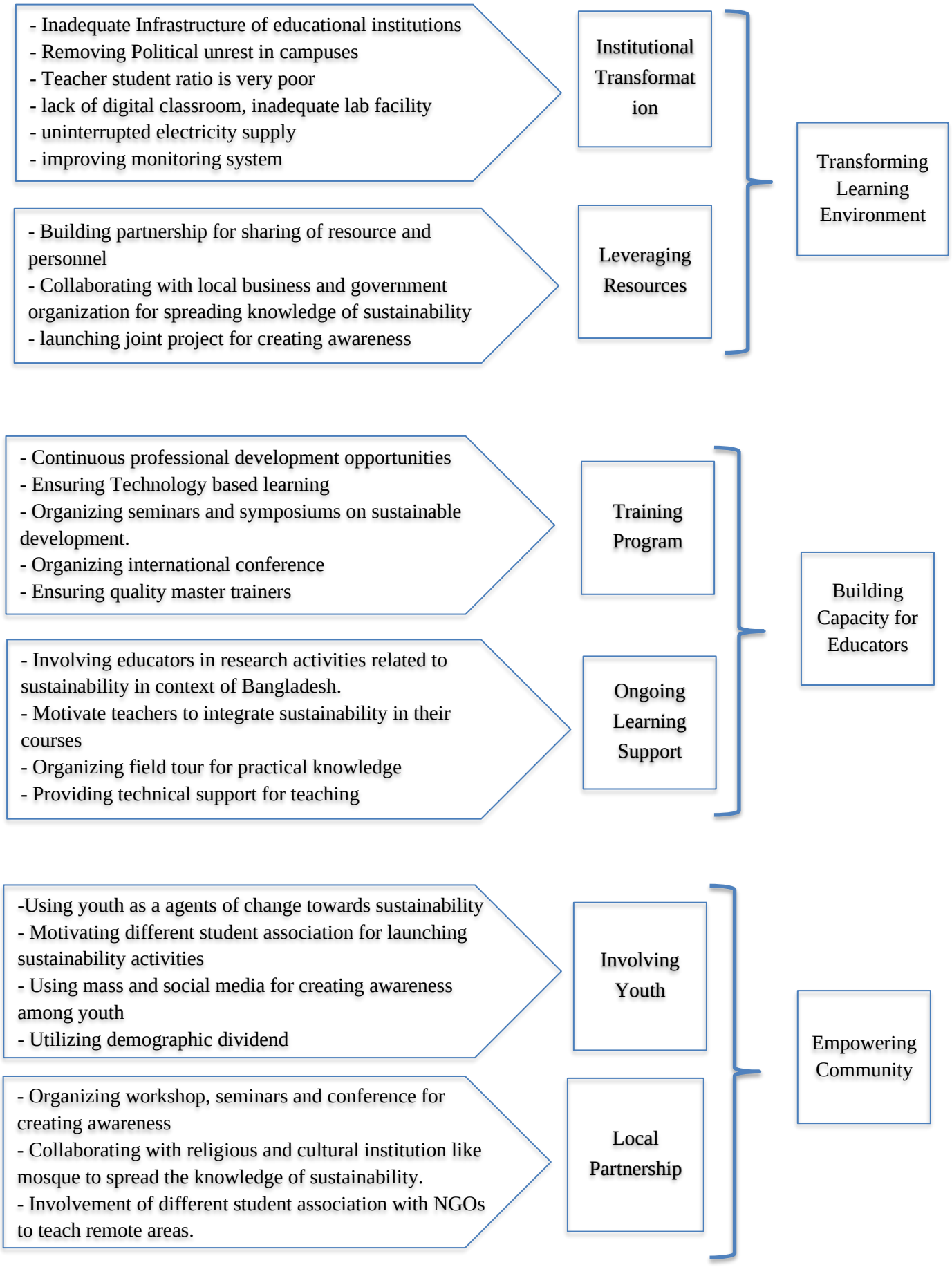
instrumental in understanding the practical aspects of ESD implementation at the grassroots level. Interviewees from educational institutions offer insights into the role of business education in promoting sustainable development, challenges, and opportunities for integrating sustainability into higher education. Their perspectives on curriculum development, teacher training, and partnership building contribute to understanding how strategic pathways for ESD can be implemented in tertiary-level education.

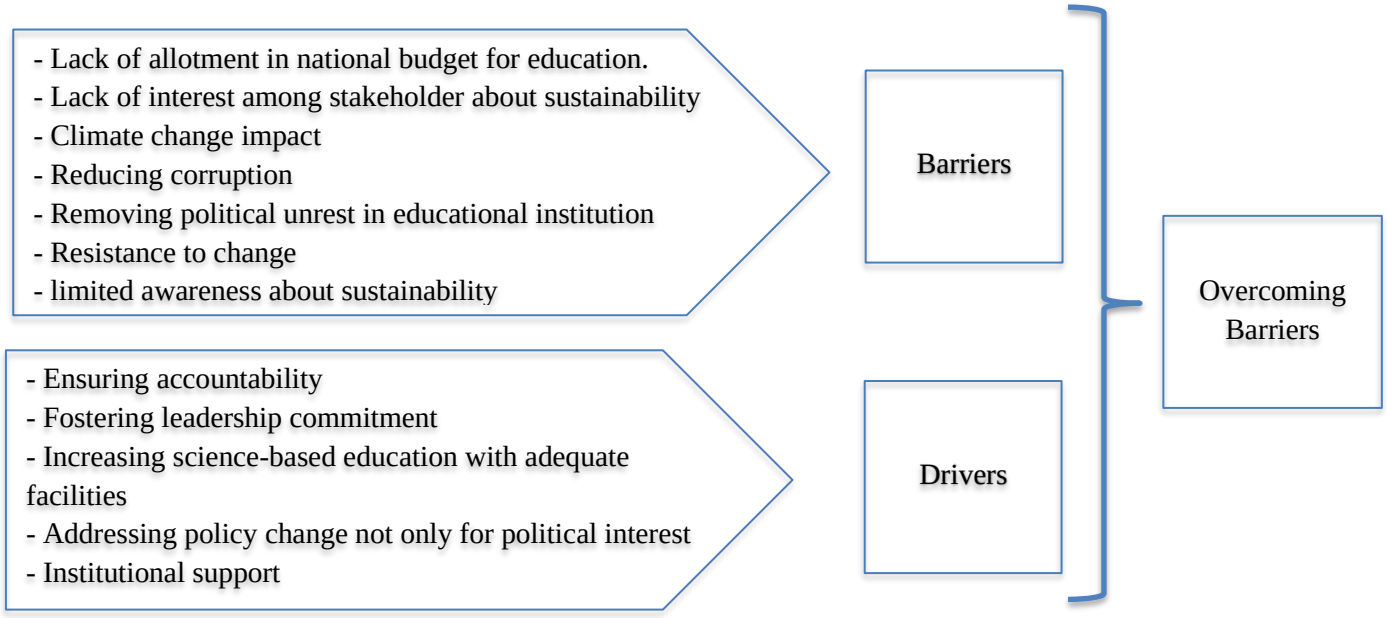
The educational administrator from DSHE and the Ministry of Education provides valuable insights into the administrative and policy aspects of implementing ESD initiatives. Their involvement in policy creation and institutional coordination offers crucial viewpoints on advancing policy measures and utilizing resources within the education system to support sustainability. In particular, a project manager at the Ministry of Education brings a distinct perspective on managing projects focused on enhancing education quality, with an emphasis on environmental sustainability. Her views on project execution, resource distribution, and community involvement help in understanding how strategic pathways for ESD can be put into action at a broader level. In summary, each interviewee's standpoint enhances comprehension of the diverse nature of ESD implementation in Bangladesh.

3.3 Data analysis

In the research analysis phase, a two-step approach is undertaken to derive insights from interviews. Initially, most of the recorded interviews are translated from Bengali to English and then the transcription is completed to capture the context of discussions. Subsequently, the transcribed interviews undergo systematic coding using ATLAS.ti software to identify patterns, themes, and insights pertinent to the research objectives. This iterative process generates thematic codes based on recurring topics and concepts, enabling the extraction of both explicit and latent content from the data. By employing this approach, the research aims to uncover perspectives on the implementation of ESD in Bangladesh.




- Inadequate Infrastructure of educational institutions
- Removing Political unrest in campuses
- Teacher student ratio is very poor
- lack of digital classroom, inadequate lab facility
- uninterrupted electricity supply
- improving monitoring system
Institutional Transformation
- Building partnership for sharing of resource and personnel
- Collaborating with local business and government organization for spreading knowledge of sustainability
- launching joint project for creating awareness
Leveraging Resources
Transforming Learning Environment
- Continuous professional development opportunities
- Ensuring Technology based learning
- Organizing seminars and symposiums on sustainable development.
- Organizing international conference
- Ensuring quality master trainers
Training Program
- Involving educators in research activities related to sustainability in context of Bangladesh.
- Motivate teachers to integrate sustainability in their courses
- Organizing field tour for practical knowledge
- Providing technical support for teaching
Ongoing Learning Support
Building Capacity for Educators
-Using youth as a agents of change towards sustainability
- Motivating different student association for launching sustainability activities
- Using mass and social media for creating awareness among youth
- Utilizing demographic dividend
Involving Youth
- Organizing workshop, seminars and conference for creating awareness
- Collaborating with religious and cultural institution like mosque to spread the knowledge of sustainability.
- Involvement of different student association with NGOs to teach remote areas.
Local Partnership
Empowering Community



Data analysis began immediately as data became available. Here, it will be reiterated how the gathered data were dealt with and made available. This study used an abductive analysis method to derive the first, second, and third-order codes (Gioia et. al., 2013). An abductive analysis is an empirical method of analyzing data that complements theoretical conceptualizations (Bell e. al., 2019). This approach emphasizes the creation of unconventional and unanticipated empirical observations in the context of existing theories. This method necessitates a continuous process of dual-fitting facts and theories. Abductive analysis is an assumption based on the interactions of current speculation and proof when irregularities or unforeseen results occur. (Gioia et al., 2013). Research Findings and observations are fully integrated into the present theoretical framework, which confirms existing theories. The analysis has three coding stages open, axial, and selective (Gioia et al., 2013). The first phase (open coding) identifies pertinent topics in the subject matter and determines comparability between interviews. Axial coding gathers data from its chronological sequence and enables thematic organization, leading to new connections between the previously inconsistent data points. The final step (selective coding) involves synthesizing the results into fundamental groups (Strauss et al., 1999). After the data was coded, findings were drawn about the research question, with a focus on important answers that were relevant and repeated across interviewees. These conclusions were critically evaluated and linked to previously discussed theories about Education for Sustainable Development and the implementation of strategic pathways within the context of Bangladesh.

3.4 Ethical consideration

To maintain ethical standards, participants were fully informed about the research objectives and their roles. Before conducting the interviews, explicit consent from each of the

interviewees was taken via consent forms with a written signature. Collected data was then anonymized to safeguard confidentiality. In all of the steps RUG ethical guideline was followed.

4. Findings

4.1. Implementation of ESD through advancing policy

4.1.1 Policy integration and prioritization

The interviews highlight the need for collaboration between the UNESCO National Commission and the Ministry of Education to develop policies prioritizing environmental education. This collaboration can involve joint planning sessions, consultations, and workshops to ensure that policies align with international standards and national development goals. Two of the educators explains-

> "*Specific policy measures necessary for integrating sustainability concepts into the curriculum effectively include collaboration between UNESCO National Commission and the Ministry of Education to develop education policy prioritizing Education for Sustainable Development."*

Policymakers need to advocate for sustainable education within the government and prioritize it in national development plans. This involves raising awareness about the importance of ESD, garnering support from key stakeholders, and ensuring that sustainable development goals are embedded in all national policies like Vision 2041, Delta Plan 2100, and programs. As one of the lecturers said:

> *"Our government already set goals to reduce poverty, increase education enrollment, increasing the number of female students in Vision 2041, Delta plan 2100. With these initiatives, they are trying to implement SDGs and they prioritize education in those policies. I believe including Education for sustainable development (ESD) in all the goals will be effective in sustainable developments."*

Furthermore, interviewees underscore the importance of prioritizing ESD within the education system. As a developing country, Bangladesh's Government has other priorities like maintaining consistent economic growth. So when they want to prioritize ESD they have to allocate sufficient funds and resources to support sustainable education initiatives. However, they don't want to cut funds from other priorities and allocate to education because the impact of sustainable education is long-term. Therefore, The urgency of this prioritization is emphasized in statements to ensure that ESD remains a central focus in educational policymaking processes.

4.1.2 Curriculum alignment

The findings reveal a consensus among interviewees regarding the crucial role of policy integration in implementing Education for Sustainable Development (ESD) within the educational landscape of Bangladesh. A key aspect highlighted is the necessity of aligning

educational policies with sustainable development goals, particularly through the integration of sustainability concepts into the curriculum. This sentiment is echoed in the statement of an assistant professor of a business faculty:

> *"I have developed the objective-based education system in our course curriculum therefore I have tried to add some sustainability issues in different courses but to be honest the current course curriculum in our country in considering all the other universities there is very lack of sustainability issues in their course curriculum therefore I feel that curriculum should be revised".*

Therefore, Policymakers must allocate sufficient resources to support the integration of sustainability concepts into the curriculum. This includes policy support and funding for curriculum development to facilitate ESD implementation across educational institutions of Bangladesh for primary to tertiary level.

4.2. Implementation of ESD through transforming learning environment

4.2.1 Institutional transformation

One of the key issues most of the interviewees raise is that they have a lack of infrastructure in every institution. Furthermore, the number of classrooms is limited, number of teacher and student ratio is very poor, lack of facilities in the lab, and limited number of ICT resources. Addressing challenges such as inadequate infrastructure requires strategic investments in educational facilities, including classrooms, laboratories, and ICT resources. As one of the educators said:

> *"I believe there are some key challenges in the sustainable development for the country. First of all, as a developing country, we have a lack of resources, this is the most important point apart from this we don't have any good infrastructure that can support our target or support our sustainable development. As we can see the Bangladesh government has already taken a sustainable development plan for 2030 and 2041 but if we want to achieve these goals we need to ensure a good amount of resources as well as we also need to ensure the educational system should develop or should advocate the sustainability so that every individual of the country can be prepared to meet the sustainable goal of the organization of our country. "*

Furthermore**,** Political unrest and social instability can disrupt learning environments and impede progress towards sustainable education. Strategies to mitigate these challenges may include promoting dialogue and reconciliation, strengthening governance structures, and fostering a culture of peace and tolerance within educational institutions.

4.2.2 Leveraging resources

As a developing country, Bangladesh has very limited resources especially in the educational institutions, all of them are struggling because they don't have enough facilities, or resource persons. For this collaborating with businesses, government organizations, and international partners can enhance sustainability initiatives by sharing knowledge, resources, and best

practices. Joint projects, workshops, and knowledge-sharing platforms can facilitate collaboration and promote the exchange of ideas and experiences. Interviewees also stress the importance of collaboration with NGOs, international organizations, and educational institutions to enhance the effectiveness and relevance of policies related to sustainability. This collaborative approach is seen as essential for addressing complex challenges and achieving meaningful progress in ESD implementation.

4.3. Implementation of ESD through building capacity for educators

The number of educators who have higher knowledge about ESD is very limited and the existing knowledge of the teachers is not good enough to integrate sustainability aspects into their courses. Addressing these challenges requires a concerted effort to build the capacity of educators. Interviewees emphasize the need for professional development opportunities and training programs to equip educators with the necessary knowledge and skills to effectively integrate sustainability into teaching practices.

4.3.1. Professional training and development programs

Educators require specialized training to effectively integrate ESD into their teaching practices. Professional development programs should focus on enhancing educators' understanding of sustainability concepts, pedagogical approaches, and practical strategies for incorporating into the curriculum. This call for capacity building is supported by the statement:

> *"ESD should be integrated into professional and in-house teacher training programs to ensure that future educators are equipped with the necessary knowledge, skills, and competencies to promote sustainability through education."*

Interviewees also stress about organizing more seminars and conferences in their institutions about education for sustainable development so all the teachers and students from different faculty can participate in those programs and learn about the recent practices of sustainable development. They also emphasize organizing international conferences so people who have practical international experiences can share their knowledge.

4.3.2. Ongoing learning support

Educational institutions can create supportive learning environments for educators by motivating teachers, providing access to resources, opportunities for collaboration, and ongoing mentorship and support by the head of the institution. This may include establishing communities of practice, organizing peer learning networks, and offering incentives for professional development. An assistant professor of a science and technology-based university shared her opinion on this:

> *"Support from top authorities is crucial to motivate teachers to integrate sustainability into their courses. As we don't have enough resources and facilities to teach our current courses. integrating the sustainability aspect would be more stressful for us. Here, the Head of our institution plays a crucial role by motivating us."*

4.4. Implementation of ESD development through empowering community

Most of the interviewees stress the importance of community engagement in advancing ESD goals. By empowering youth as agents of change and involving local communities in ESD initiatives, educational institutions can foster a culture of sustainability beyond the classroom.

4.4.1 Youth engagement: Youth can be powerful agents of change for sustainability, and educational institutions play a critical role in engaging them through awareness campaigns, leadership development programs, and opportunities for active participation in sustainability initiatives. By empowering youth to take action on environmental and social issues, educational institutions can cultivate a culture of sustainability and inspire future generations to become responsible global citizens. A lecturer from the science faculty mentioned how youth can help spread the knowledge of sustainability.

> *"Educational institutions can engage youth as agents of change through awareness campaigns and youth associations. Activities like campus cleaning and environmental conservation can promote sustainability."*

4.4.2 Local partnerships: Collaboration with local communities, including religious institutions, NGOs, and grassroots organizations, can amplify the impact of ESD initiatives and foster greater community ownership and support. By building partnerships with diverse stakeholders, educational institutions can leverage local knowledge, resources, and networks to address sustainability challenges and create positive social and environmental change. As an assistant professor of the university said:

> *"I believe that we can initiate some workshops in the local communities, local organizations that already have some sustainability issues or who can play a big role in it. organizations where we can find lots of people, we can organize some workshops or training programs led by the universities and also we can create challenges for them by giving them some competition with other organizations so we can use the concept of Elton Mayo which is group-based competitions. Moreover, International collaboration is also necessary and our government can also play a big role in it. "*

Furthermore, In the context of Bangladesh Religious institutions like mosques and local member of parliament can contribute to promoting ESD by incorporating sustainability topics into their speech. This involvement can help raise awareness and foster a sense of responsibility toward sustainable practices among individuals within the community. A few of the interviewees mentioned:

> *"As a Muslim country, most of the people go to the mosque on Friday and other days during prayer. Imam could share the knowledge of sustainable development before Friday prayer through a speech in the mosque. In addition, local members of parliament act as role models by sharing the knowledge and importance of sustainability during their speech."*

4.5. Barriers and drivers for implementation of ESD in the context of Bangladesh

Despite the recognition of the importance of ESD, interviewees identify various challenges in policy implementation. These include inadequate infrastructure, limited resources, poor teacher quality, and the impact of external factors such as climate change. These challenges are highlighted by the multifaceted nature of obstacles faced in integrating ESD into educational policies.

Limited funding and budgetary constraints can hinder the implementation of ESD initiatives, particularly in resource-constrained settings like Bangladesh. Strategies to overcome financial barriers may include advocating for increased investment in education, leveraging external funding sources, and optimizing resource allocation through cost-effective planning and management.

> An assistant professor of Jahangirnagar University commented *"The common barrier is resistance to change which is very common in our country in any case. So we should be prepared for this resistance to change. Inadequate funding in the budget for education is another barrier. Apart from this adjustment to cultural diversity can be one of the barriers. In addition, lack of stakeholder interest is also very common. Furthermore, as a developing country people are very cost-sensitive, people try to reduce the cost though it damages the environment. We can make sure to understand the value of environmental sustainability. Businesses should understand that they can't run a business if people are suffering from their production."*

Political unrest and instability can disrupt educational activities and undermine efforts to promote sustainability. Every year most of our top educational institutions had to shut down because of the turmoil created by the political student organization. Addressing these challenges requires political will, dialogue, and collaboration among government officials, policymakers, and civil society stakeholders to create a conducive environment for sustainable education. In addition, Cultural diversity, social norms, and traditional beliefs may pose challenges to the implementation of ESD initiatives, requiring culturally sensitive and contextually appropriate approaches that respect local values and customs while promoting sustainable development goals. Bangladesh is a country where you will find people from many cultural and religious backgrounds, and ethnicity. Therefore, integrating and spreading the knowledge of education for sustainable development depends on the regions and people.

However, Ensuring Accountability is one of the drivers for implementing strategic pathways toward establishing Education for Sustainable Development (ESD) in a developing country like Bangladesh. By holding all stakeholders accountable for their roles in promoting ESD, there is a greater likelihood of effective implementation of sustainable education initiatives. This accountability can help track progress, identify areas for improvement, and ensure that commitments towards sustainability are met. In addition, strong leadership commitment is

essential for driving sustainable education agendas forward. Leaders especially the heads of the educational institutions can play an important role by influencing policy decisions, allocating resources, and inspiring others to actively engage in promoting sustainability. Moreover, Enhancing science-based education with adequate facilities can provide students with the necessary knowledge and tools to understand and address sustainability challenges. A Project manager of the Ministry of Education stated:

> *"Our government prioritizes science-based education and launched a program to ensure this by developing a 10-storied science building with enough facilities in every government school and college. Initially, we are building these infrastructures in the main schools and colleges of the main cities where the number of students is higher and later we will expand it to every district and sub-district level to ensure "*

Furthermore, in countries like Bangladesh when there is a government shift, the new government changes the previous policy only for political interest. So, it is crucial to address policy changes driven by a genuine interest in promoting sustainability rather than solely for political gains. Policies that prioritize ESD based on a genuine commitment to sustainable development can create a conducive environment for implementing strategic pathways toward sustainable education in Bangladesh. Institutions play a significant role in providing the necessary infrastructure, resources, and guidance for the successful implementation of ESD initiatives.

Overall, the findings underscore the significance of advancing policies that prioritize ESD and ensure its effective integration into educational systems. Collaboration among stakeholders, capacity building for educators, and community engagement emerge as key strategies for successful policy implementation in this domain. Despite challenges, concerted efforts in policy integration can pave the way for sustainable development in Bangladesh's educational ecosystem.

5. Discussion and Conclusions

This research explores the strategic methods for implementing Education for Sustainable Development (ESD) in Bangladesh, a developing nation with its own set of obstacles and prospects. The insights obtained from discussions with educators and higher officials from the government offer a thorough investigation into the diverse strategies needed to embed sustainability into Bangladesh's educational system. The discussion section of this paper blends these insights with established theoretical literature and practical. It starts with comparing the findings with four strategies with existing theories.

5.1. Implementation of four strategic pathways for ESD in the context of Bangladesh

The importance of developing policies in line with sustainable development principles and putting them into practice is crucial to promoting Education for Sustainable Development(ESD). A teacher of a technological university and an officer of DHSE

emphasized the need for specific policy actions like clearly stating ESD in different national policies of Bangladesh and increased funding for education in the national budget to incorporate ESD into the education system. These ideas are supported by Policy Implementation Theory, which underscores the importance of clear policies and adequate resources for successful implementation (Mazmanian & Sabatier, 1989). Furthermore, engaging all stakeholders in the creation of policies as proposed by an assistant professor at Jahangirnagar University is in line with the strategy endorsed by Agenda 2030 of sustainable development.

The integration of sustainability concepts into the curriculum is a foundational step towards ESD. According to most of the interviewees updating the tertiary education curriculum with relevant sustainability topics is essential. This aligns with UNESCO's advocacy for curriculum reform that embeds sustainability principles across all levels of education (UNESCO, 2017). Both educators and administrators emphasized the need for training policies to educate teachers about sustainability, which corresponds with findings from Tilbury (2011) who noted that educator capacity-building is crucial for the effective implementation of ESD.

Fig: Four strategic pathways to implement ESD in Bangladesh

Advancing Policy It is a foundational step towards establishing ESD • Policy Formulation and Implementation • Integrating Sustainability into the Curriculum	**Transforming Learning Environments** Involves addressing infrastructural and resource-related challenges • Institutional transformation • Leveraging resources
Building Capacities of Educators Professional development for educators is critical for the effective delivery of ESD • Training and development program • Ongoing learning support	**Community Engagement** Engaging students in sustainability initiatives through youth associations, environmental clubs, and practical experiences • Empowering youth as agents of change • Building partnerships with the local community

Transforming learning environments to support ESD involves addressing infrastructural and resource-related challenges. Most of the interviewees pointed out issues such as inadequate infrastructure and political unrest that affect student attendance and engagement in education. Their suggestion about enhancing these environments through partnerships with businesses and government organizations can facilitate the spread of knowledge which will help to reduce immediate resource limitation to a certain extent. This echoes the recommendations of the

Global Action Programme on ESD, which advocates for whole-institution approaches and community partnerships (UNESCO, 2014).

Professional development for educators is critical for the effective delivery of ESD. Educators from both universities and colleges emphasized the need for ongoing training programs, seminars, and workshops focused on sustainability. This is consistent with the findings of Barth et al. (2007), who highlighted the importance of continuous professional development in fostering educators' abilities to teach sustainability. Additionally, the use of technology-based learning tools and international collaboration, as suggested by these educators, can enhance the quality and reach of professional development initiatives.

In addition, empowering youth as agents of change is a recurring theme across the interviews. Both educators and administrators stressed the importance of engaging young students who will be the future leaders of the country in sustainability initiatives through existing student associations and environmental clubs and involving them in practical projects. This approach is supported by Tilbury et. al. (2011), who found that involving students in real-world sustainability projects enhances their understanding and commitment to sustainable practices. Furthermore, leveraging community resources, such as religious institutions and local NGOs, can amplify the impact of ESD initiatives and foster a culture of sustainability within the community.

However, there were several obstacles to implementing ESD in Bangladesh highlighted during the interviews. Insufficient infrastructure, political instability, and a lack of interest from stakeholders are the most important ones from many barriers. However, these challenges are not unique to Bangladesh. These obstacles are very common in other developing nations as well (Leicht et al., 2018). Overcoming these hurdles necessitates an approach that involves increasing funding, engaging stakeholders, and forming partnerships. The perspectives shared by the interviewees align, with the suggestions of Sterling (2001), who emphasizes the importance of making changes and creating a policy environment to promote sustainable education.

5.2. Contribution to theory

The study adds to theoretical frameworks in the realm of sustainable education and development. Initially, it investigates the aspects of establishing strategic approaches for ESD in a developing nation. By addressing the challenges, opportunities, and tactics for implementation the findings enhance our comprehension of how policies and programs are put into practice effectively. Moreover, the results contribute to advancing our knowledge of sustainability education by stressing the significance of incorporating ESD into curricula, reshaping learning environments, enhancing educator capabilities, and empowering communities. These insights are in line with sustainability education principles that emphasize teaching methods, encouraging environmental stewardship and social accountability. Additionally, both the research question and findings shed light on policy implementation complexities within educational reform and sustainable development contexts. By examining how policymakers, educators, and communities drive transformations this study deepens our

understanding of how policies are developed, executed, and assessed in ever-evolving socio-political environments. Furthermore, the findings provide perspectives on organizational change processes, within educational institutions. The study adds value to change management theory by recognizing obstacles to change and suggesting ways to overcome resistance. It underscores the significance of leadership, capacity development, and stakeholder involvement in facilitating transformations. Moreover, it enhances community development theory by highlighting the role of educational institutions in empowering communities to tackle sustainability issues. By encouraging partnerships and cooperation among schools, NGOs, government entities, and local stakeholders the study advocates for development and collective action to drive sustainable changes. In essence, the research question and outcomes enrich frameworks in sustainable education, policy execution, change management, and community development by shedding light on practical hurdles and strategies for implementing Education for Sustainable Development in a developing nation context such as Bangladesh.

5.3. Implications, limitations, and future research

The results underscore the importance of policymakers focusing on and dedicating resources to incorporating Education for Sustainable Development (ESD) into the curriculum. This involves updating policies, pushing for funding, and building collaborations, with global organizations and industry professionals. Moreover, Educational institutions can use the insights from this research to develop professional development programs for educators focused on sustainability education. They can also leverage partnerships with businesses, government organizations, and NGOs to enhance sustainability initiatives within the learning environment. In addition, Community stakeholders, including youth, NGOs, religious institutions, and governmental bodies, can use the findings to collaborate with educational institutions in promoting ESD at local levels. Initiatives such as awareness campaigns, practical initiatives, and partnerships can empower communities to take action towards sustainability.

The study mainly centers on Bangladesh, which could restrict how broadly the results can be applied to developing nations with varying socio-political settings. To enhance the comprehension of implementing ESD, upcoming studies could investigate questions in a range of contexts. Additionally, the interviews carried out for this study might not reflect all viewpoints, within the education sector, in Bangladesh. Future research could consider using sample sizes or alternative sampling methods to encompass an array of perspectives. Furthermore, the study mainly depends on gathering information through interviews, which might be influenced by biases and limitations typical of qualitative research methods. To enhance the depth of understanding of the research topic future studies could combine data with quantitative analyses or utilize mixed methods approaches.

Future research could conduct comparative studies to explore the implementation of ESD in different developing countries. Comparing policies, practices, and outcomes across diverse contexts could provide valuable insights into effective strategies for promoting sustainability education globally. Moreover, longitudinal studies could track the implementation of ESD initiatives over time to assess their long-term impacts on educational outcomes, environmental sustainability, and community development. Understanding the sustainability of ESD

initiatives is essential for informing future policy and practice. In addition, future research could evaluate the effectiveness of specific interventions aimed at promoting ESD within educational institutions. This could include assessing the impact of professional development programs for educators, curriculum revisions, and community engagement initiatives on student learning outcomes and behavior change. Furthermore, exploring the role of cross-sectoral collaboration in promoting ESD could be a fruitful area for future research. This could involve examining partnerships between educational institutions, government agencies, businesses, and civil society organizations in advancing sustainability goals at local, national, and global levels.

In conclusion, this research paper on Educational Ecosystems for Sustainable Development in Bangladesh serves as a comprehensive exploration of the strategic pathways for implementing Education for Sustainable Development (ESD) within the context of sustainable entrepreneurship. By emphasizing the alignment of initiatives with national and global sustainability goals, the paper underscores the critical role of policy support, curriculum alignment, capacity building of educators, and community engagement in advancing ESD. The findings and recommendations provided offer a blueprint for progressing sustainable education in Bangladesh and similar settings, highlighting the importance of collaboration among key stakeholders. Moving forward, continued efforts in policy integration, resource allocation, and transformative leadership will be essential in fostering a culture of sustainability and entrepreneurship within the educational ecosystem, ultimately contributing to a more sustainable and prosperous future for Bangladesh and beyond.

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Appendix A: Interview Guide

- Introduction personal + topic
- Consent form: please take some time to read it, the main points are:
    - this interview will be recorded
    - anonymized, no one will know who exactly the answers came from
    - you have the right to not answer any questions or even stop the interview at any point

Starting questions:

1. Please tell me about your role in your organization?

2. Why do you think your role is important for developing sustainable education?

Main part: In this section the strategic pathways towards establishing Education for Sustainable Development (ESD) will be used.

3. Advancing Policy

a. What specific policy measures do you believe are necessary to integrate sustainability concepts into the curriculum effectively?

b. How can policymakers ensure that ESD is prioritized and sustained within the education system amidst competing priorities?

4. Transforming Learning Environments

a. What challenges do educational institutions in Bangladesh face in creating environments conducive to ESD implementation?

b. How can educational institutions leverage resources and partnerships to enhance sustainability initiatives within their environments?

5. Building Capacities of Educators

a. What professional development opportunities or training programs do you believe are essential for building educators' capacity in ESD?

b. How can educational institutions support ongoing learning and skill development for educators to effectively integrate ESD into their teaching practices?

6. Empowering Community

a. How can educational institutions include youth as agents of change for sustainability?

b. How can local communities help in promoting ESD in Bangladesh?

Ending questions

7. What barriers or obstacles do you foresee in implementing strategic pathways for ESD in Bangladesh?

8. Is there anything else you would like to share about this topic or clear up or change any of your previous answers?

Thank You for participating!

Appendix B

Information Sheet
Informed Consent Form
Ethics Checklist
Signed Consent Form
Interview Transcript and Summary