RETHINKING OF EDUCATION FOR SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE EDUCATION: THE CASE STUDY OF INDIA

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ABSTRACT

In the age of globalization, characterized by the emergence of alarming global issues, the role of education in promoting and fostering sustainable development (SD) is becoming increasingly pivotal. In 2015, global leaders came together to establish the 2030 agenda for SD with 17 goals to achieve a thriving and sustainable planet. Later on, Education for Sustainable Development (ESD) has been introduced as a means to effectively combat sustainability challenges and cultivate a sense of environmental responsibility among students. The research aims to investigate the depth and breadth of the impact of incorporating SDG principles and climate change on educational contexts. The study sheds light on the current state of ESD and climate change education implications and challenges faced throughout this process. Central to this inquiry is an investigation of the role of the United Nations Sustainable Development Solutions Network (UN SDSN)'s mission, particularly the organization's one of the biggest initiatives- Global Schools Program (GSP) in implementing SDGs and the advocacy of integrated approaches to include SD principles via educational initiatives. The methodology involves case study and content analysis to address the research question and achieve the project objectives. The policy recommendations seek to inform educators, curriculum developers and policymakers on the strategies for strengthening the integration of SD principles and climate change within educational systems. Ultimately, the research contributes to the ongoing discourse on the significance of education in achieving SDGs and combating pressing climate change related challenges.

Keywords: education for sustainable development, sustainable development goals, SDG 4.7, climate change education, UN SDSN, GSP, India

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INTRODUCTION

Climate change depicts a global emergency necessitating widespread awareness and understanding of its causes, impacts, and repercussions. This knowledge is crucial for individuals to make informed decisions and to foster the adoption, innovation, and scaling up of effective, locally appropriate solutions for climate change mitigation and adaptation. Education emerges as the most promising tool in this endeavor, providing a comprehensive, systematic approach to equip learners with the requisite knowledge, skills, values, and attitudes necessary for informed action and meaningful contributions. Numerous studies have shown that societies with higher levels of education experience fewer human casualties from climate change disasters (UNESCO, 2023a; CCE 2020, 2022; LiFe 2023). Implementation of Education for Sustainable Development (ESD) and climate change education are central to tackling the lack of awareness and enhancing action to fight climate change, thereby contributing to the creation of a more sustainable world. SDG 4.7 aims to contribute to this goal and the anticipated determinants for this goal encompasses evaluating the degree to which (i) global citizenship education and (ii) education for sustainable development, incorporating gender equality and human rights, are integrated into (i) national education policies, (ii) curricula, (iii) teacher training, and (iv) student assessment (UNESCO 2021).

The study places special emphasis on the case of India as one of the most committed countries in striving to achieve SDG 4.7 and integrating Education for Sustainable Development (ESD) and climate change education into its education systems nationwide. Hereby, the research poses two central questions to investigate the country's actions toward ESD and climate change education:

1) To what extent is India's approach to implementing ESD and climate change education effective?
2) How can India overcome its challenges to ensure effective implementation of ESD and climate change education?

The project is motivated by the author's internship experience in the UN SDSN and alignment with the values and mission of the organization's GSP initiative. It is also driven by the recognition of the fundamental role of education in shaping environmentally conscious global citizens capable of tackling alarming XIX century challenges with climate change at its core. The

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research provides fresh insights and perspectives on ESD and climate change education coupled with its more effective implementation for greener minds. It contributes to developing more feasible solutions to global environmental issues through policy recommendations, exploring literature gaps and bridging them. The literature made a valuable input into discussions revolving around inclusion of SDG into school curricula, however there are many complexities that need attention to be addressed. The capstone project combines analysis from current literature and policy documents to address central questions and brings new perspectives on better assessment of SD and climate change inclusion into India's education systems.

LITERATURE REVIEW

In the pursuit of a green future, education plays a tremendous role in preparing individuals who are not only knowledgeable about ongoing challenges but also equipped to tackle them. The existing literature mostly sheds light on "what needs to be done?" part of the issue rather than "how to implement ESD?". It draws attention to the importance of ESD, climate change and environment education, theories, concepts, methodologies and hence lags behind emphasizing the effectiveness of current approaches to ESD and climate change education.

Ivan Govender examines the efforts of Durban University in the provision of inclusive education for the transition from economic to sustainable environment (2016). The study explores students' knowledge on the environment within the general education program and provides insights into practical implementation of sustainable education. Similarly, Pauw et al. quantifies the effectiveness of ESD through structural equation modeling and concludes that ESD significantly affects student's sustainability awareness (2015). The research provides valuable insights on the role of educational approaches labeled as holistic and/or pluralistic impacting students' perception of sustainability. In the light of these thoughts, Didham and Ofei-Manu hold the same perspective on the role of education as a catalyst to achieve SDGs. They argue that the education system drives human, cultural and social capital acknowledging the transformative power of ESD.

Inga Žalėnienė and Paulo Pereira emphasize the significant role of higher education institutions as key agents to reach sustainability (2021). They believe that ESD contributes to preparing future leaders with green skills and committed to sustainability. In contrast, Parry and Metzger's

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work determine challenges faced in implementing ESD (2023). Their research identifies key barriers such as disciplinary silos, assessment focus, and inadequate professional learning opportunities. These issues come from the teacher 's perspective and signal for more comprehensive approaches toward ESD implementation. Moreover, Kioupi and Voulvoulis stress the challenge to connect SDGs to educational outcomes and redefine ESD and climate change education to better use it as a tool for transformative changes (2019). In response, they introduce a participatory approach to effectively involve education stakeholders and learners toward achieving a common vision on sustainability. Norris Erhabora and Juliet Dona's study seeks to measure the influence of climate change education in India on the attitude of students toward sustainability and overall knowledge (2016). They reveal that environmentally aware students possess more potential to become future change makers and thus provide insights on the transformative role of education in shaping knowledge and environmental consciousness. Elaine Nevin's examination of ESD and climate change education is different from other authors as he talks about the need for interrelationships between development education (DE), education for sustainable development (ESD), and environmental education (EE) (2008). His study specifically focuses on the Irish education system and national policy framework while at the same time providing new insights that other education systems can take advantage of.

The existing literature on ESD and climate change education and its implications sets a stage for the capstone project to base its analysis on and simultaneously contribute to bridge gaps, highlight opportunities and provide more effective measures to implement ESD in the existing body of knowledge and praxis. It takes advantage of various international organization reports, political documents, case study analysis to conduct a thorough research to measure changes and challenges in students' perceptions of SDG principles and climate change knowledge.

Shedding light on different organizations besides UN SDSN that focus on ESD in practice, UNESCO provides a wide range of sourcebooks and toolkits for better understanding of integration of SDGs into education with practical strategies and theoretical frameworks. Global Schools Forum, International Schools Partnership (ISP), Ban Ki-Moon Center, Millennium Promise, among others follow the same path and introduce various approaches to ESD and climate change education. In conclusion, the literature makes a significant contribution to have a

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comprehensive understanding of ESD and climate change education and its implications for different countries.

METHODOLOGY

The project involves secondary source and content analysis methodology to thoroughly address the research question. The extensive literature review on ESD and climate change education has been conducted where national curricular frameworks and a wide range of initiatives in India to achieve SDG 4.7 have been analyzed. The existing literature provides a comprehensive understanding of key concepts, best practices and challenges associated with ESD principles incorporation into educational systems. It specifically investigates the implications of the ESD coupled with its challenges across different countries of the world. Moreover, the research takes advantage of GSP reports where extensive quantitative data has been gathered through surveys, interviews and other assessments to capture students' awareness levels of global environmental challenges and their involvement to achieve SDG 4.7. Global Schools reports provide a representative and inclusive statistical analysis of 107 countries and serve as a guiding framework for evaluation of effectiveness of educational initiatives in aligning with wider SDGs. Furthermore, the organization's research on ESD implementation in India provides a great opportunity to investigate the efficacy of SDG 4.7 achievement in the country.

Through conducting secondary research the project aims to discover potential gaps in the existing literature and bridge it. The incorporation of sustainable development guidelines and climate change education into classrooms is a tough process and thus case study analysis of India makes it easier to grasp progress and challenges of one country at the local level. GSP measurement of ESD implementation in different countries and regions also takes into account case study analysis to discover different factors that influence integrating SD into educational systems. The outcome of the capstone project is to provide educators, policymakers, curriculum developers and organizations valuable insights and more effective approaches to better assess ESD and climate change education implications for a more sustainable future where education is at its core.

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ESD AND CC EDUCATION IN ACTION

Several policy statements have been taken by the UN to achieve SDG4 and 4.7 whose success remains unclear. These include: Rio Declaration on Environment and Development in 1992, adoption of the resolution to launch UN Decade of Education for Sustainable Development (DESD) in 2002, the establishment of Global Action Program (GAP) for ESD during UNESCO World Conference on ESD in 2014, the Incheon Declaration of 2015, among others. UNESCO's role in promoting climate change education and ESD implementation in general has been crucial and involved strong political commitment, engagement of stakeholders, and unified action. The establishment of the Greening Education Partnership by the UN Secretary General in 2022 was a wake-up call for countries to enlighten education systems to address pressing environmental challenges. Four green pillars of the initiative include: greening schools, curriculum, teacher training and education systems's capacities and communities (UNESCO 2023).

Pedagogy	Description
A **learner-centered** approach	emphasizes the active development of knowledge through learning experiences that require learners to reflect on their own knowledge and learning processes
Action-oriented learning	draws on Kolb's experiential learning cycle with the following stages: 1. Having a concrete experience, 2. Observing and reflecting, 3. Forming abstract concepts for generalization, and 4. Applying them in new situations [27]
Transformative learning	empowers learners to question and change the ways they see and think about the world in order to deepen their understanding of it [26, 28]

Table 2. Key pedagogies for implementing ESD

Source: Parry and Metzger 2023

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UN SDSN's Global Schools Program operates in 107 countries with a network of 1,560 schools encompassing 119,659 teachers and 1,449, 481 students (GSP 2022). The organization trained more than 635 advocates, 100+ mentors and conducted 4,817 school-wide activities on SD (Ibid). Global Schools produces resources such as lesson plans, activity guides, toolkits, training, mentorship programs and many more. The lesson plans are available in more than 12 languages and makes it accessible to many countries across the world. All Advocates surveyed

believe that their efforts have raised awareness of SD and ESD within their communities. Additionally, 98% of Advocates report that their activities have increased awareness of sustainable development among students, while 99% express that their involvement in the program has had a positive impact on their students (GSP 2021, 2022). Most common SDGs throughout the advocacy program and lessons revolve around SDG 1, SDG 2, SDG 3, SDG 4, SDG 5, SDG 6, and SDG 13.

Education influencing climate change	Climate change influencing education
Imparting knowledge, skills and attitudes for climate actions: education provides knowledge about climate change, its causes, impacts, and the range of solutions and actions on mitigation, adaptation and resilience. It empowers learners to take appropriate actions to prevent and mitigate climate change impacts and address its challenges within their respective areas and fields	**Policy inclusion**: addressing climate change also calls for the development of inclusive policies that promote integration of climate change education, environmental literacy, youth empowerment, vocational training, green skilling, community engagement and sustainability principles in various national frameworks (like policies on climate change, disaster management, youth development, etc.)
Building capacity: education equips individuals with the skills, competencies and tools necessary to engage in climate-related discussions, professions, research, technology development, policy-making and community initiatives	**Curriculum integration**: climate change requires integrating climate-related topics into educational curricula across disciplines, ensuring students are equipped with the knowledge and skills to understand and respond to climate change
Shaping attitudes and behaviours: education can instil values of environmental stewardship, sustainability and responsible consumption, influencing individuals' actions towards mitigating and adapting to climate change	**Community engagement**: climate change can mobilize educational institutions and stakeholders to promote a whole-institution approach[17] and engage with local communities, fostering partnerships and initiatives for climate adaptation, mitigation and resilience
Driving innovation: education fosters critical thinking, problem-solving and creativity, enabling the development of innovative solutions and technologies to address climate challenges	**Education infrastructure resilience**: the potential risks and impacts of extreme weather events require school infrastructure design and planning to become resilient, safe and child-friendly

Table 1. Reciprocal influences between climate change and education

Source: CEE research team

The fulfillment of global agreements varies by country, with limited progress achieved since ESD became a central topic of the table in 1992. Despite the relevance of this issue to all 17 SDGs, none have been fully achieved as of 2030 approaches. At the recent ECOSOC Youth Forum 2024, numerous young leaders echoed this sentiment, emphasizing the need to shift focus from "what can we do?" to "how can we do it?" This recurring challenge has persisted since earlier resolutions, with many UN forums characterized by empty discussions and minimal outcomes. While high-level events unite leaders and change agents, effectively addressing each SDG requires comprehensive government involvement at all levels.

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ESD enforcement began with raising awareness and the Decade played a significant role in spreading awareness and ESD as a concept. The shift to capacity building and implementation has occurred where ESD succeeded (Laurie et al. 2016; Arbuthnott 2009; Calder and Clugston 2003). However, the proof of evidence on ESD efficacy and measurement has always been debatable. Its contribution to overall quality of education concerned many teachers and policymakers. Living in the era of easy access to information, the big questions are how to analyze information and how to apply it. The ESD learning process also entails asking critical questions, encouraging positive mindset, developing thinking skills in general (Tilbury 2011, 29). The ESD pedagogy is not only about raising awareness of SDGs and other global challenges but also fostering issues investigation, cooperation and real-world problem solving (McKeown & Hopkins, 2010; Norris and Dona 2016; Nolet 2016; Tilbury 2011; UNESCO, 2012b). All these have been practiced within a wide range of interdisciplinary contexts and implemented to alarming sustainability issues. The case of India sheds more light on above mentioned issues and more effective ways to tackle these obstacles.

OVERVIEW OF CHALLENGES OF ESD AND CC EDUCATION IMPLEMENTATION

Despite the aspirations outlined in the UN 2030 Agenda, particularly the acknowledgment of Quality Education (SDG4) as pivotal for achieving other SDGs, the specific objectives of education for sustainability, as highlighted in target 4.7, remain ambiguous. Empirical studies on ESD effectiveness are limited due to limited positive impact of educational strategies. It is no surprise that measuring impact always presents challenges and complexities.

Diversity of the education system poses one of the biggest challenges to localize ESD due to the fact the standards, regulations, curriculum and teaching methods vary. Adoption of ESD as a universal concept into different local contexts is difficult (Down 2006; Gough and Scott 2006; NCERT 2023). Implementation of ESD requires a deep understanding of local culture, education system of the country, literacy rate and identifying skills, values and behaviors across environmental, economic and social aspects. Another big challenge is the lack of ESD curriculum productivity evaluation mechanism that makes the ESD impact ambiguous. It is tough to measure its influence in the long term and how it affects students' attitudes, behaviors

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and skills. This issue is more prominent in developing countries where schools struggle with comprehensive measurement of ESD (Kioupi and Voulvoulis 2019).

The literature acknowledges that education is a cornerstone of all SDGs achievement. While it's true, the complexity of sustainability as a term is often neglected and creates a challenge to relate it to educational outcomes. In other words, the main purpose of ESD is left in uncertainty. Its implication has not transformed societies into sustainable societies with a green mindset and skills. Many researchers have come to the conclusion that educators face the same challenges when it comes to the implementation of ESD despite many context-specific differences. These common barriers include multidimensional elements of sustainability, lack of resources for professional learning opportunities and implementation, content for student-centered learning, time for collaboration, among others (Parry and Metzger 2023)(see Table 3).

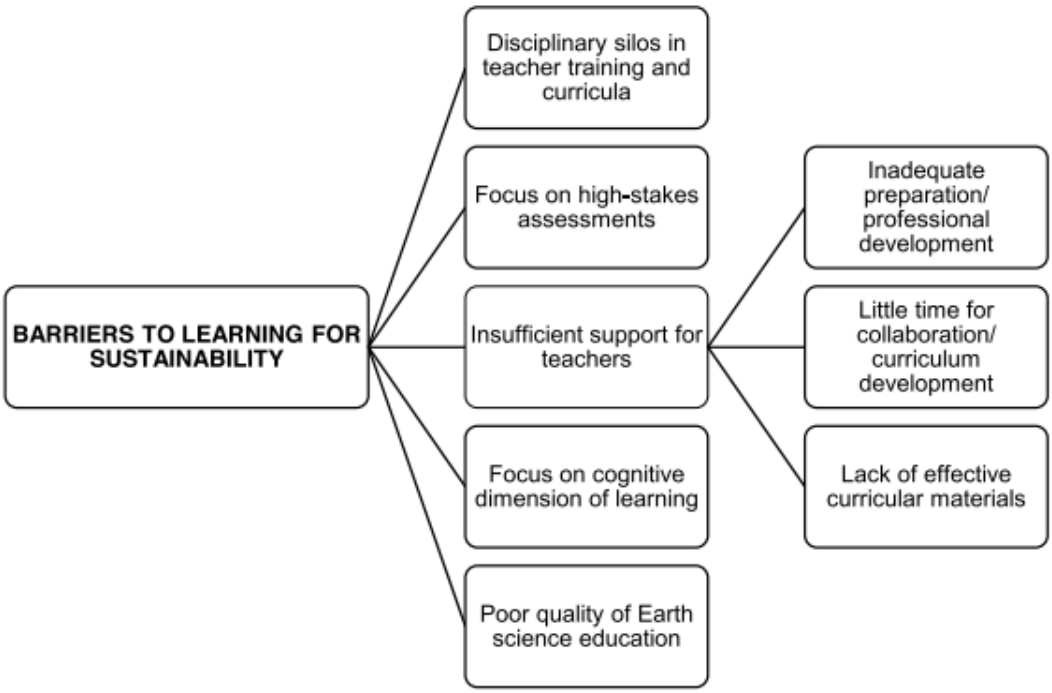

Table 3. Barriers to learning for sustainability

Source: Parry and Metzger 2023

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UNESCO and Education International conducted a survey which encompassed 58,000 primary and secondary teachers revealing that educators prefer teaching cognitive skills over social and behavioral learning where problem solving and taking action are at its core (Parry and Metzger 2023; UNESCO 2023). Heavy focus on testing, lack of enough training and underpaid teachers have been emphasized as major obstacles to ESD implementation at a classroom level. Most of the studies neglect the state of professional preparation of teachers to integrate SDGs into the classrooms which is crucial to ensure comprehensive learning. The research investigated different academic settings in both developed and developing countries including Europe, Asia, Africa and the Caribbean to examine teachers' viewpoints on ESD (UNESCO 2021, 2022). The way how teachers perceive ESD plays a pivotal role in their teaching approaches and how they prepare future agents of change. Educators serve as the foundational elements in translating sustainability education policies into classroom implementation (Franz and Steiner 2013; Fien and Heck 2003; Glavic 2020; Bertschy 2015). The study exposed that "ESD is mostly associated with the teaching of scientific knowledge on the environment" (UNESCO 2006, 2010). It also revealed that 90 percent of teachers recognize the importance of ESD and its related concepts and 80 percent of them are eager to learn more about the discipline (Ibid). The majority of teachers responded that the appetite for learning ESD and its implications for classroom management has not been met. The difficulty lies in determining whether high school students genuinely grasp the challenges of the 21st century and the Sustainable Development Goals. This challenge stems partly from the complexity of the concepts involved and the chaotic nature of the modern world. Additionally, it hinges on the extent to which students are intellectually equipped to comprehend contemporary global issues. It's essential to note that students' interests also significantly influence their understanding of the SDGs and how effectively teachers convey various topics.

To combat the challenges highlighted above, the Global School Program launched a pilot project in three countries: Ghana, Turkey, and Morocco. The project aimed to localize UNESCO's core competencies for ESD through collaboration with esteemed researchers and advocacy organizations in each country. Research teams mapped UNESCO competences and the SDGs into K-12 curriculum and policies of three countries and created a toolkit for future ESD implementation (GSP 2021). The localization process and enforcement within schools was

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documented through regular surveys and interviews with stakeholders. The study lasted for 18 months with final country reports being launched at the UNESCO World Conference on ESD in May 2021. The study served as the foundation for Ministries of Education in late 2021 to integrate ESD into national curricula. Moving forward, the development of national implementation strategies and research teams of Ghana, Morocco and Turkey will continue with the support of GSP. The next section puts special emphasis on India as one of the best examples of ESD and CC education implementation and explores the country's progress at all levels.

INDIA: PAVING THE WAY FOR ESD AND CC EDUCATION

Skill development for youth, climate change, and education are critical areas of economic concern in India (CEE India 2020). With one of the largest populations of young people and a rapidly emerging economy, it has the potential to become the skill capital of the world. India is one of the excellent examples of the ESD successful implementation where it's implemented not only on an international level but also nationally. India embarked on mandating for environmental education in 1991, but its inclusion occurred in 2005 under the National Curriculum Framework (NCF) for formal education curricula and the University Grants Commission (UGC) Guidelines for higher education (IIEE 2023). The NCF emphasized that environmental concerns and issues should be integrated into every subject through various activities, including project work. Subsequently, the syllabus and textbooks were updated to reflect these changes. In the meantime, India is planning to include ESD principles into early childhood care and education to encompass transformative changes at all levels. The National Education Policy (NEP) of 2020 laid down the foundation to integrate ESD into multidisciplinary education systems where essential subjects are included. It anticipated pre-school education to ease the transition and theoretical learning however the scope of the emphasis was small (NEP 2020). The country aims to expand the scope and mandate environmental education into preschool programs and childhood education.

India is the second top country of Global Schools Program with more than 200 schools and almost 500,000 students (GSP 2022). The government sees the integration of sustainability and climate change into education as one of the main priorities of the country and hence enforced many policy frameworks and initiatives to successfully incorporate ESD principles into

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classrooms. Since 2020, India has undertaken efforts to localize Education for Sustainable Development (ESD) by introducing a National Education Policy and revising the National Curriculum Framework for School Education. Throughout these processes, the Ministry of Education in India has been actively engaged. Later on, Mission Lifestyle for Environment (LiFE) was released by Prime Minister Narendra Modi at COP 26 in Glasgow in 2021 to further foster sustainability and green skills in India's future generations (LiFE 2024). LiFE's core mission is to call upon the global community and institutions to prioritize thoughtful and intentional utilization, rather than thoughtless and detrimental consumption for the preservation of the environment. Additionally, in 2023, the National Curriculum Framework for School Education (NCFSE) was developed to specifically address climate change within environmental education (DSEL 2023; UNESCO New Delhi 2023). This framework underscores the importance of integrating concepts of Education for Sustainable Development (ESD) across all school systems. Furthermore, UNICEF has played a pivotal role in spearheading various initiatives across multiple cities, including Bihar, Chhattisgarh, Jammu, Kashmir, Gujarat, among others. Through these initiatives, a comprehensive climate education program has impacted over 8.4 million schoolchildren in each city, with participation from more than 100,000 schools (UNESCO New Delhi 2023). Pedagogical methodologies employed to integrate ESD and climate change education include curriculum-based, activity-based, whole-school and project-based learning, classroom transactions, eco clubs, outdoor education, community engagement (NCF 2023). On the global stage, India has exhibited a robust dedication to address alarming environmental challenges, including climate change through participation at COP26 in 2021 and the announcement of a low-carbon development program at COP27. Its presidency of the G20 is another example of India's commitment to take transformative actions for a greener and more sustainable future.

India currently ranks 4th globally in installed capacity for renewable energy, particularly in wind and solar power (UNESCO New Delhi 2023; CCE 2024). In efforts to foster the use of renewable and environmentally friendly fuels and decrease reliance on imported fuel, the country initiated the Ethanol Blended Petrol Programme (Ibid). This project commenced in January 2003, allowing the sale of petrol blended with 5% ethanol in nine states and union territories. Surpassing expectations ahead of schedule by June 2022, India achieved a 10% blending of

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ethanol with petrol, resulting in savings of approximately INR 50,000 crores (US$6.02 billion) in foreign exchange, along with reductions in greenhouse gas emissions and offering farmers an alternative source of income (UNESCO 2022; DSEL 2023). The country is highly committed to combat climate change and enforced many policies and programs such as The National Mission for Enhanced Energy Efficiency (NMEEE), National Action Plan for Climate Change (NAPCC), Perform, Achieve and Trade (PAT), among others. India's dedication to tackle climate change and environmental challenges at all levels encouraged its commitment to incorporating ESD values into the school system to prepare students with green minds and skills for a more sustainable future. Sometimes, the commitment of a country to addressing environmental issues and its overall perspective are overlooked when assessing the implications of Education for Sustainable Development in various countries. The stronger a country's commitment to implementing the SDGs, the more likely governments are to enact policies and programs aimed at integrating ESD into school systems (Pandve 2009; NCERT 2023; CCE 2022). " The importance of environmental science and environmental studies cannot be disputed with continuing problems of pollution, loss of forest, solid waste disposal, degradation of environment, issues like economic productivity and national security, global warming, the depletion of ozone layer and loss of biodiversity" (UGC 2023). Hence, India introduced a wide range of national policies to incorporate ESD into different education systems.

The driving force behind India's commitment to climate change solutions and ESD implementation at all levels is its high vulnerability to climate change that influences each sector of social and economic development. It causes damage to educational infrastructure, resources, displacement and in general the well-being of its population (UNESCO New Delhi 2023). Climate change is not only hitting the economy hard but the quality of education, hence causing gaps in policies and enforcement, teacher training and resources, effective pedagogy approaches, and assessment of green skills. As highlighted earlier, India took extensive measures to combat these issues and enforced many policies and programs at governmental level. However, most of the policies do not determine explicit strategies for integrating climate change into India's education system or other initiatives for climate empowerment (NAPCC 2023). The reason behind this is lack of resources and prioritization. Apart from that, in most of the policy documents there is no mention of training and capacity-building as extensive efforts to tackle

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climate change and environment education (NDC 2022; NAPCC 2023; NCF 2023). In the light of these thoughts, some of the essential gaps for ESD and climate change education are teaching resources, training and aids to ensure effective SD incorporation into classrooms. This issue has been previously addressed and is particularly prominent in the case of India.

Defining the boundaries of ESD, integration into local contexts and designing content for various age groups and intellectual levels pose significant obstacles. ESD, climate change and environment education are interchangeably used but they are different. Each concept is interdisciplinary and multifaceted even though many aspects overlap. ESD necessitates the integration of critical subjects such as climate change, disaster risk reduction, health and well-being, equity, and sustainable consumption into the curriculum. It also requires a transformation in the role of teachers, shifting from merely imparting knowledge to facilitating learning experiences that enable students to develop essential sustainability competencies. The multidisciplinary nature of ESD, climate change and environment education presents a recurring challenge for educators and teachers. In this vein, many scholars and experts in the field neglect to draw distinction between three concepts and it hugely affects developing a curriculum for classroom management. Moreover, designing a program in an age-appropriate way taking into account regional variations, vastness and changing nature of climate change and sustainable development domains presents another barrier to successful implementation. While climate change is a global challenge its influence varies locally and hence learners ought to be educated to distinguish local impacts and seek local solutions to it. It is worth noting that the NCF for School Education 2023 and NEP 2020 took several measures to address this issue, however, it requires many financial resources, teacher aids and training, among others.

Another big obstacle for climate change education and ESD implementation in India is a language barrier. The majority of scientific knowledge creation on climate change occurs in English (CCE 2020, 2022, 2024). The extensive linguistic diversity in India, encompassing not only various spoken languages but also differences in English proficiency, poses challenges for integrating this knowledge into curricula and disseminating it effectively (Vachharajani 2023). This underscores the need for concerted efforts to address linguistic diversity in India and to ensure that all information and data pertaining to climate change and education are accessible in all Indian languages. The Global Schools Program took steps to address this issue by making its

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resources available in Hindi, thereby increasing accessibility to educational materials on climate change and sustainability in India. In general, the program's resources are available in 12 languages, with plans for additional translations in the future to ensure accessibility for a wider range of schools.

The majority of teachers utilize exams and quizzes to test the knowledge of students as it is quick and accessible (IIEE 2023; CCE 2024). This method should be shifted to action-oriented learning to better assess the knowledge of students to ensure effective learning (see Table 2). This evaluation approach definitely requires more time and effort investment for both teachers and students, however to achieve positive results this method needs to be anticipated as it encompasses systems and critical thinking, problem solving and attitudinal shifts. While grasping the scientific dimensions of climate change and other environmental issues is vital, mere understanding is not enough to instigate change. Therefore, the emphasis should pivot towards practical, hands-on learning experiences that equip students with the practical green skills and confidence to take proactive action. The next section elaborates more on recommendations to reassess ESD and CC education in India.

RECOMMENDATIONS: ESD AND CC EDUCATION REIMAGINED

Mainstreaming education for sustainable development enforcement and climate change education has to be reassessed through:

- age-appropriate curriculum, syllabus, textbooks with consideration of regional differences and language diversity
- developing training and practical for teachers and educators
- reconsidering knowledge and awareness assessment approaches and shift to action-oriented and transformative learning
- investing more financial resources into climate change education and ESD initiatives

The effectiveness of climate change education hinges on its delivery across various educational settings, particularly within the formal education system, as emphasized by CCE (2022). A critical aspect of this delivery involves the incorporation of updated textbooks, teachers' handbooks, and teaching and learning materials (TLMs), necessitating investment. However,

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inadequate funding and resources allocated to schools hinder their ability to invest in teaching resources and aids for climate change education, limiting the scope for knowledge-building and creativity among teachers. In addressing this challenge, initiatives like the Green Skill Development Programme (GSDP) have emerged, aiming to empower youth to take action on climate change. Yet, despite the mandate outlined in NEP 2020, there remains no specific budget allocated for environmental or climate change education. This underscores the urgent need to secure funds dedicated to relevant components and activities within climate change education. To achieve its climate action targets outlined in its Nationally Determined Contributions (NDCs), India requires substantial financial resources, estimated at around US$ 2.5 trillion by 2030 and an additional US$ 10.1 trillion to meet its net zero targets by 2070 (Khanna et al. 2022; NCERT 2023). However, there exists a significant deficit of 75 percent in India's total financial requirement to meet its NDCs, with the majority of green finance originating from domestic sources, both public and private (Ibid).

This deficit underscores the imperative to scale up existing climate finance through both domestic and international channels and allocate funds specifically towards climate change education. In India, funding for education primarily originates from government budgets at the national and state levels, multilateral organizations, and corporate funding under Corporate Social Responsibility (CSR). The Government of India has demonstrated its commitment to the education sector by allocating its highest-ever budget of INR 1.12 lakh crores (US$13.66 billion) for the FY 2023/24, with a significant portion earmarked for school education (Hindustan Times, 2023). This substantial allocation reflects the government's recognition of the importance of education, including climate change education, in shaping a sustainable future.

The challenges posed by the climate crisis have compounded existing obstacles faced by educators in enhancing their expertise in delivering effective climate change education. Consequently, there arises a pressing need to establish platforms for empowering educators in climate literacy, which holds the potential for far-reaching impacts. Equipping teachers with climate change education not only enables students to comprehend climate issues but also encourages them to explore interdisciplinary solutions. Moreover, providing teachers with access to such education underscores the critical connection between children's consumption habits and responsible behaviors. Teachers serve as indispensable pillars of the education system, shaping

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the values and perspectives of future generations. Therefore, it is essential to empower educators to spearhead climate action education initiatives, necessitating efforts to enhance their capacities and knowledge dissemination among children and youth, ultimately translating knowledge into actionable change.

CONCLUSION

To put things into perspective, the integration of education for sustainable development and climate change education presents both challenges and opportunities for many countries. Through various initiatives and policy frameworks, India has made significant strides in incorporating sustainability principles and climate literacy into its education systems. However, several obstacles persist, including inadequate funding, limited teacher training, linguistic diversity, and the need for age-appropriate and region-specific curriculum development. Addressing these barriers requires committed efforts at both the national and international levels. Investments in teacher training programs, the development of practical resources and materials, and increased funding allocation for climate change education are crucial steps toward building a more sustainable future. Additionally, greater emphasis on action-oriented learning approaches and the promotion of interdisciplinary solutions can empower students to become agents of change in their communities.

By reassessing current strategies and prioritizing climate change education within the broader context of sustainable development, India can continue to pave the way for effective ESD implementation. With its vast population of young people and emerging economy, India has the potential to lead the world in fostering a generation of environmentally conscious and empowered citizens. In essence, the journey towards sustainable development and climate resilience requires collaborative efforts from governments, educators, communities, and individuals alike. By working together to overcome existing challenges and capitalize on available opportunities, the country has a full capacity to create a more equitable, resilient, and sustainable future for generations to come.

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