



FROM CLIMATE CRISIS TO CLIMATE ACTION: THE ROLE OF EDUCATION IN CREATING A SUSTAINABLE FUTURE

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RESEARCH ARTICLE



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Abstract

Climate Change is no longer limited to an environmental concern; it has become a major global challenge that affects ecosystems, human life, and development processes worldwide. Its impacts can be seen in rising temperatures, extreme weather events, and increasing vulnerability of communities, particularly in developing countries like India. These changes are not only environmental but also social and economic, as they influence inequality, livelihoods, and overall well-being. Addressing this issue requires not only technological solutions and policy measures but also meaningful changes in human behaviour, attitudes, and values. In this regard, Education plays a crucial role in enabling such transformation. This conceptual paper explores the causes and effects of climate change and examines how education can help shift society from climate crisis to climate action. Drawing on existing literature and policy frameworks, the study suggests that education should move beyond awareness and focus on developing critical thinking, responsibility, and active participation among learners. It concludes that a climate-responsive education system is essential for promoting a sustainable and resilient future.

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Introduction

“Sustainability is no longer about doing less harm; it is about doing more good.” — Jochen Zeitz

Climate Change is widely recognized as one of the most defining challenges of the 21st century, posing unprecedented risks to ecological systems, human livelihoods, and global development trajectories. It is no longer a distant environmental concern but an immediate and intensifying crisis affecting both natural and human systems. Characterized by long-term changes in temperature, precipitation patterns, and the increasing frequency of extreme weather events, climate change is largely driven by anthropogenic activities such as fossil fuel combustion, deforestation, and industrial expansion (IPCC, 2023). These transformations have far-reaching implications not only for environmental sustainability but also for social and economic stability. What distinguishes the current situation as a “climate crisis” is not merely the scale of environmental degradation, but also its rapid pace, growing intensity, and unequal distribution of impacts across regions and populations. Vulnerable communities, particularly in developing countries like India, bear a disproportionate burden of climate impacts despite contributing minimally to global greenhouse gas emissions (UNICEF, 2021; World Bank, 2022). This disparity highlights the deeply embedded links between climate change, inequality, and issues of social justice. In this context, Education assumes a transformative role. Education extends beyond the transmission of knowledge; it is a critical process for shaping values, attitudes, and behaviours that support sustainable living (UNESCO, 2019). It equips individuals with the capacity for critical thinking, informed decision-making, and collective action. Therefore, this paper argues that education can serve as a crucial bridge between climate awareness and climate action, enabling societies to respond more effectively and responsibly to environmental challenges.

Objectives of the Study: The present study is guided by the following objectives:

1. To examine the concept and multidimensional nature of Climate Change and its implications for human development.
2. To analyse the impact of climate change on Education, particularly in terms of access, continuity, and quality of learning.
3. To explore the ways in which climate change contributes to educational inequality, especially among vulnerable and marginalized groups.
4. To evaluate the role of education in promoting climate awareness, behavioural change, and resilience.
5. To identify gaps in existing education systems in addressing climate-related challenges.

6. To propose a conceptual framework linking climate change, educational disruption, and climate action.
7. To suggest strategies for developing climate-responsive and transformative education systems for a sustainable future.

Literature Review

Education is widely acknowledged as a key driver in converting climate awareness into meaningful climate action, particularly within the Indian context. However, existing research points to a continuing disconnect between policy goals and their actual implementation in classrooms. A variety of studies—including empirical surveys, curriculum analyses, and pedagogical discussions—highlight both the strengths and limitations of current educational practices. Tripathy et al. (2024) underline the significant role of education in building climate awareness, promoting sustainable lifestyles, and fostering critical thinking skills required to address environmental challenges. In a similar vein, Goel et al. (2023), through a large-scale study of school students, found that although learners recognize the seriousness of climate change and show readiness to act, they often lack a clear understanding of how climate change education differs from general environmental education. This conceptual ambiguity can reduce the effectiveness of educational efforts. From a curriculum standpoint, Singh and Ahmad (2025) note that climate-related content is integrated into subjects like science and social science; however, it remains largely theoretical and content-driven, offering limited opportunities for critical engagement, inquiry, and hands-on learning. As a result, students may struggle to develop practical, action-oriented competencies. To address these shortcomings, several researchers advocate for innovative teaching approaches. Sharma (2025) and Dwivedi and Dwivedi (2025) emphasize the importance of interdisciplinary methods, project-based learning, and community participation in encouraging climate action. Nevertheless, they also point out persistent barriers such as insufficient teacher training, limited resources, and weak institutional support, which continue to hinder effective implementation. Adding to this perspective, Jones et al. (2022) demonstrate the success of arts-based and multidisciplinary approaches in the East Kolkata Wetlands, where climate education was approached as a collaborative and participatory process rather than being confined to scientific instruction alone. Such context-sensitive and creative methods show strong potential in bridging the gap between awareness and action. Overall, the literature indicates that while education in India has considerable potential to drive climate action, its effectiveness is constrained by structural, pedagogical, and conceptual challenges. Addressing these issues is essential for enabling education systems to move beyond mere awareness-building toward fostering sustained, action-oriented environmental behaviour.

Research Gap

Although existing studies highlight the role of education in addressing climate change, there remains limited conceptual integration between climate-induced disruptions and educational inequality. Most research focuses either on environmental impacts or educational responses in isolation. There is a lack of comprehensive frameworks that connect climate change, educational disruption, and transformative action, particularly in the Indian context. This study attempts to bridge this gap by developing a conceptual understanding of education as both affected by and responsive to climate change.

Conceptual Framework

Understanding Climate Change and Educational Inequality

Climate Change should be viewed not only as an environmental issue but also as a structural factor that influences social and developmental processes. Its effects are shaped by existing socio-economic conditions, which result in unequal levels of vulnerability among different populations. Among the most affected are children, especially those from marginalized backgrounds, who face greater challenges in accessing continuous and quality Education. In this study, climate change is conceptualized as a source of disruption that contributes to educational inequality. Climate-related events such as floods, droughts, and heatwaves interrupt schooling, damage infrastructure, and force communities to relocate. These impacts are unevenly distributed, disproportionately affecting rural, economically weaker, and socially disadvantaged groups, thereby widening existing educational disparities.

Pathways Connecting Climate Change and Education

The link between climate change and education can be explained through three interconnected pathways:

(a) Disruption Pathway

Climate-related events directly interfere with educational processes through:

- Temporary or prolonged school closures due to extreme weather
- Damage to educational infrastructure
- Displacement of students and teachers

Such disruptions reduce effective teaching time and interrupt the continuity of learning (UNESCO, 2022).

(b) Inequality Pathway

Climate disruptions further intensify existing inequalities:

- Marginalized children experience greater learning loss
- Girls face a higher risk of discontinuing education
- Rural areas suffer more severe infrastructural damage

In this way, climate change functions as a **multiplier of inequality** (UNICEF, 2021).

(c) Adaptation and Response Pathway

Education systems attempt to respond through adaptive measures such as:

- Adoption of digital and flexible learning approaches
- Inclusion of disaster preparedness in education
- Development of community-based learning initiatives

However, unequal access to resources limits the effectiveness of these responses (World Bank, 2022).

Role of Education in Addressing Climate Change

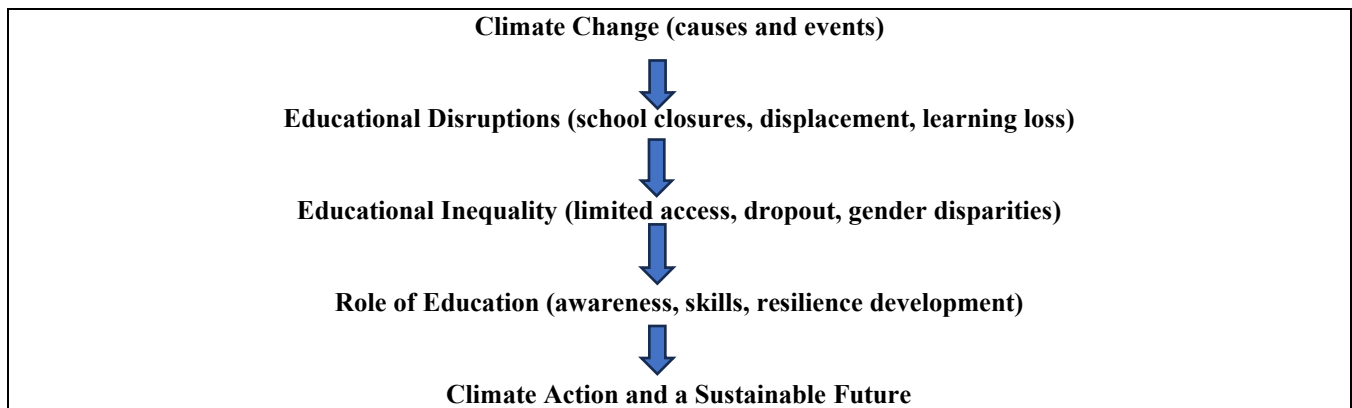
While climate change negatively affects education, education itself plays a vital role in responding to climate challenges. Its contributions include:

- **Climate Literacy:** Building understanding of causes and impacts
- **Behavioural Change:** Encouraging sustainable practices
- **Resilience Building:** Preparing individuals to cope with disasters
- **Critical Thinking:** Promoting innovation and problem-solving

Thus, education operates in a dual capacity:

- i. As a sector impacted by climate change
- ii. As a key mechanism for climate action

Proposed Conceptual Model: The conceptual model for this study can be described as follows:



Interpretation of the Framework

This framework indicates that climate change indirectly affects long-term development by disrupting education systems. However, when education systems are made climate-responsive, they can break this cycle of disruption and inequality, transforming vulnerability into resilience. In this context, education serves as both a mediating and transformative force, capable of turning climate-related challenges into opportunities for sustainable development. The framework highlights that education should not be seen only as a sector affected by climate change, but as a powerful instrument for converting climate vulnerability into resilience and promoting sustainable action.

Climate Change and Its Impact on Education

Interconnections between Climate Change and Education

Climate Change and Education are closely linked, as emphasized in the UNESCO Global Education Monitoring Report (2024). Climate change should not be viewed only as an environmental issue; it also significantly disrupts education systems and learning outcomes. Its effects on education occur both directly, through damage to school infrastructure and loss of life, and indirectly, by affecting livelihoods, health conditions, and patterns of displacement (UNESCO & MECCE, 2024). Importantly, these impacts are unevenly distributed, with marginalized and vulnerable groups facing greater challenges, thereby intensifying existing inequalities within education systems.

Direct Impacts: Disruptions in Schooling

Climate-related events such as floods, droughts, and extreme weather conditions frequently interrupt schooling processes. Over the last two decades, a large proportion of extreme weather events in low- and middle-income countries have led to school closures, affecting millions of learners. Research findings indicate that:

- Areas affected by floods experience lower school attendance
- Drought conditions are associated with poorer learning outcomes
- Extreme weather events disrupt the regular flow of academic activities

For instance, children living in flood-prone regions are less likely to attend school compared to those in unaffected areas. These disruptions reduce effective teaching time and contribute to long-term learning gaps.

Long-Term Implications for Learning and Development

The effects of climate change on education extend beyond immediate disruptions and have lasting consequences for children's development. Exposure to climate-related shocks, particularly during early childhood, can negatively influence cognitive growth, health, and overall educational achievement. Evidence suggests that:

- Drought conditions can lower performance in subjects such as mathematics and reading
- Early exposure to environmental shocks can affect language development and cognitive abilities
- Continued exposure to disasters is linked with fewer years of schooling

These findings indicate that climate change affects not only access to education but also the quality and effectiveness of learning outcomes.

Indirect Effects: Poverty, Child Labour, and Displacement

Climate change also influences education indirectly by worsening socio-economic conditions. Environmental shocks often reduce household income, especially in agriculture-dependent communities, which limits families' ability to support children's education. The report highlights that:

- Flood exposure can reduce the total years of schooling in countries such as India and Ethiopia
- Climate-related stress increases the likelihood of child labour as a coping strategy
- Many young people report that climate change affects their ability to continue education due to financial constraints

In addition, climate-induced disasters lead to large-scale displacement. Millions of people are forced to relocate each year, creating barriers to education such as lack of resources, documentation issues, and unstable living conditions (UNESCO & MECCE, 2024).

Climate Change as a Driver of Educational Inequality

The report clearly identifies climate change as a factor that intensifies educational inequality. Its effects are more severe among:

- Children from economically weaker backgrounds
- Those with limited parental education
- Populations living in environmentally vulnerable areas

Studies show that climate-related disruptions disproportionately affect school participation and learning outcomes, with noticeable differences across socio-economic groups and genders. As a result, climate change not only deepens existing disparities but also creates new forms of educational disadvantage.

Towards Climate-Resilient Education Systems

To respond effectively, the report stresses the importance of developing education systems that are resilient to climate challenges. Key strategies include:

- Strengthening school infrastructure to withstand environmental risks
- Integrating climate change topics into educational curricula
- Enhancing teacher training for climate education
- Promoting awareness and participation at the community level

Such approaches are necessary to ensure that education systems remain functional and inclusive even in the face of climate-related disruptions. Climate change not only disrupts educational processes but also fundamentally alters access, quality, and equity within education systems, thereby shaping long-term human development outcomes (UNESCO & MECCE, 2024).

Role of Education in Climate Action

Education as a Means of Climate Awareness and Understanding

Education plays a significant role in addressing Climate Change by enhancing awareness and understanding among learners. The UNESCO Global Education Monitoring Report (2024) highlights that education enables individuals to comprehend the causes, consequences, and risks associated with climate change, thereby supporting informed decision-making. However, the report also notes that increased awareness does not necessarily lead to corresponding action. This reflects a gap between knowledge and practice, which education systems need to address more effectively (UNESCO & MECCE, 2024).

Enhancing Climate Literacy and Critical Thinking

An important function of education is to develop climate literacy, which goes beyond basic knowledge to include critical thinking and responsible action. According to the report, education should help learners:

- Examine environmental issues critically
- Understand their social and economic implications
- Identify solutions at both individual and collective levels

Moving away from rote learning toward reflective and analytical thinking is essential for enabling individuals to deal with complex climate-related challenges.

Encouraging Behavioural Transformation

Education has the potential to shape attitudes and behaviours in ways that support sustainability. The report suggests that educational processes can promote environmentally responsible practices such as conserving resources, minimizing waste, and adopting sustainable consumption patterns. At the same time, it emphasizes that traditional teaching methods, which rely heavily on theoretical instruction, are often inadequate. More effective outcomes can be achieved through experiential, participatory, and action-oriented approaches to learning (UNESCO & MECCE, 2024).

Building Adaptation and Resilience Capacities

Education also contributes to strengthening resilience and adaptive capacity among individuals and communities. The report underlines the importance of equipping learners with:

- Skills related to disaster preparedness
- Awareness of local environmental risks
- The ability to respond effectively to climate-related situations

These competencies are particularly crucial in regions that are highly vulnerable to climate impacts. By enhancing resilience, education helps mitigate the long-term consequences of environmental disruptions.

Limitations in Existing Education Systems

Despite its importance, the report identifies several shortcomings in current educational practices related to climate change:

- Insufficient integration of climate change within curricula
- Predominance of theoretical over practical teaching methods
- Limited teacher training in climate-related topics
- Lack of emphasis on local and contextual issues

These limitations reduce the capacity of education systems to prepare learners for real-world environmental challenges.

Moving Towards Transformative Climate Education

The UNESCO report calls for a transition towards transformative education, where learning leads to meaningful action rather than mere awareness. This approach involves:

- Embedding climate-related content across different subjects
- Promoting interactive and experiential learning methods
- Connecting classroom knowledge with real-life environmental situations
- Encouraging values such as responsibility, sustainability, and global citizenship

Such an approach enables learners to actively participate in addressing climate challenges rather than remaining passive recipients of information.

Education as a Driver of Climate Action

Education can function as a powerful driver of climate action by empowering individuals to:

- Adopt sustainable lifestyles
- Engage in community-based environmental initiatives
- Contribute to broader social and policy-level change

The report emphasizes that when young people are equipped with relevant knowledge and skills, they can play a significant role as agents of change in tackling climate issues. Thus, Education needs to move beyond its traditional focus on knowledge transmission and evolve into a system that fosters behavioural change, critical awareness, and collective action in response to climate challenges (UNESCO & MECCE, 2024).

Discussion

The relationship between Climate Change and Education demonstrates that climate change extends beyond an environmental concern and functions as a structural issue that influences educational access, quality, and equity. Insights drawn from the UNESCO Global Education Monitoring Report (2024) indicate that climate change affects education through multiple interconnected pathways, including direct disruptions, socio-economic challenges, and systemic inequalities, all of which shape educational outcomes. A key finding of this study is that climate change serves as an amplifier of existing educational inequalities. Although climate-related disruptions impact all children, their severity and consequences differ considerably across socio-economic groups. Children belonging to marginalized and economically disadvantaged communities, particularly those in climate-sensitive regions, encounter greater obstacles in accessing continuous and quality education. This not only deepens pre-existing disparities but also creates a reinforcing cycle between climate vulnerability and educational disadvantage. Another critical aspect is the cumulative nature of disruptions. While interruptions in schooling due to climate events are often seen as temporary, their long-term effects are substantial. Frequent school closures, loss of instructional time, and ongoing learning gaps gradually weaken educational achievement. Over time, these factors contribute to increased dropout rates, limited skill acquisition, and reduced life opportunities. In this way, climate change impacts not only immediate learning conditions but also broader trajectories of human development.

The discussion further identifies a significant disconnect between awareness and action. Although climate-related topics are increasingly included in educational systems, the emphasis often remains on theoretical understanding rather than practical application. As highlighted in the UNESCO report, awareness alone does not lead to meaningful change. There is a need to move toward action-oriented and transformative forms of education, where learners actively engage in problem-solving and adopt sustainable practices. Moreover, education must be viewed from a dual perspective—as both impacted by climate change and as a potential solution. On one side, education systems are vulnerable to climate-related disruptions; on the other, they have the capacity to equip individuals with the knowledge, skills, and values required to address these challenges. This dual role positions education as a key mechanism in facilitating the transition from climate crisis to climate action. The analysis also reveals important system-level gaps in current educational responses. Limited integration of climate issues within curricula, inadequate teacher training, and insufficient attention to local contexts reduce the overall effectiveness of climate education. In many instances, global environmental concepts are not adequately connected to local realities, making it difficult for learners to relate knowledge to their everyday experiences. Therefore, it is essential to reconceptualize education systems as climate-responsive and resilience-focused frameworks. This involves not only revising curricula but also implementing broader institutional changes, including strengthening infrastructure, enhancing teacher capacity, and promoting community involvement. Education must evolve into a dynamic and participatory process that empowers learners to actively contribute to climate solutions. Climate change should be recognized as an issue of educational equity, where environmental disruptions interact with socio-economic inequalities to create uneven learning opportunities and outcomes.

Conclusion

Climate Change is no longer confined to being an environmental issue; it has become a major global challenge that affects various dimensions of human development, including Education. This study has shown that climate change disrupts education systems through both direct and indirect mechanisms, influencing access to schooling, continuity of learning, and overall educational quality. Importantly, these impacts are not equally distributed, as they tend to affect vulnerable and marginalized groups more severely, thereby widening existing educational inequalities. The findings further indicate that climate change acts as a multiplier of inequality, intensifying socio-economic disparities and restricting educational opportunities for disadvantaged populations. Continuous disruptions, learning losses, and increased chances of dropout collectively pose serious risks to children's long-term development. In this context, climate change must be understood not only as an environmental or developmental issue but also as a significant concern related to education and social justice. At the same time, the study highlights the important role of education in addressing climate-related challenges. Education has the potential to go beyond simple awareness and contribute to the development of critical thinking, responsible behaviour, and active participation. However, to fully realize this potential, education systems need to shift from traditional, knowledge-focused approaches toward more action-oriented, climate-responsive, and transformative learning models. The study also points out several gaps within existing education systems, such as inadequate integration of climate-related content, limited teacher preparedness, and insufficient attention to local contexts. Addressing these challenges requires a comprehensive approach that includes curriculum reforms, teacher capacity building, development of resilient infrastructure, and greater involvement of communities.

In conclusion, the transition from climate crisis to climate action largely depends on how effectively education systems adapt to environmental challenges. A climate-responsive education system can play a crucial role in enhancing resilience, reducing inequalities, and supporting sustainable development. Therefore, investing in education is essential not only for individual advancement but also for securing a more sustainable and equitable future. Therefore, Education is not merely a source of knowledge but a pillar of hope; in the context of climate change, protecting education is fundamental to protecting the future.

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