

Climate change: Educational needs of students

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Dear Editor,

Climate change significantly threatens global health, impacting people directly (1). It refers to prolonged shifts in climate patterns resulting from human activities that alter the atmosphere's composition. This challenge manifests in extreme weather events like heatwaves, ice melting, rising sea levels, and intensified floods and droughts (2,3). While the Earth's climate remained relatively stable for millennia, it has rapidly escalated over the last 50 years. Human-induced greenhouse gas emissions, including carbon dioxide and methane, are key drivers of this global warming trend (4,5).

Human society is currently confronted with a significant climate crisis extending well into the 21st century and beyond. Tackling this crisis necessitates a strong reliance on today's youth, who are currently in school and have the potential to drive transformative change. International agreements such as the United Nations Framework Convention on Climate Change and the Paris Agreement underscore the critical role of climate change education. They advocate for promoting educational initiatives and tailored programs, particularly in developing nations and among involved parties (6).

Comprehending the Earth's climate and the impact of greenhouse gases, along with implementing strategies to mitigate them globally and locally, necessitates scientific expertise and critical thinking. Climate science addresses neglected topics in educational curricula, requiring collaboration across various scientific disciplines like earth sciences, physics, chemistry, biology, mathematics,

social sciences, and economics. Understanding the intricate interplay between social and natural systems is crucial for linking local actions to global repercussions. Therefore, a multidisciplinary approach involving social, health, and economic sciences is essential. Education in this realm should emphasize unity, collective effort, and ethical values by integrating these elements effectively (7).

Addressing the effects of climate change is one of the greatest challenges humanities will face in the coming decades. The Conference of the Parties (COP) serves as a vital international platform for evaluating progress on climate change issues. The objectives of the 2021 United Nations Annual Climate Change Conference (COP26) include achieving global net zero carbon emissions by the middle of the century, enhancing the ability of human societies and natural ecosystems to adapt, mobilizing necessary financial resources to address climate impacts, and promoting collaboration among governments, businesses, and civil society. Participating countries agreed to a new 10-year Work Programme on Action for Climate Empowerment to encourage youth engagement, climate education, and public participation (8). The UNESCO Programme, Climate Change Education for Sustainable Development, aims to help people understand the impact of global warming today and increase climate literacy among young people (9).

Climate change is a critical issue in the modern era, adversely impacting human health and quality of life. Due to their developmental stage, children are particularly susceptible to its detrimental effects. The health of young ones is compromised by escalating air pollution, severe weather events, intense heat waves, diminished water quality and availability, food scarcity, and heightened exposure to harmful chemicals (10). Consequently, this puts children at an increased risk of experiencing psychological distress, nutritional deficiencies, contagious illnesses, allergies, and respiratory conditions (11).

Students need to understand that the pillars of life, such



as the integrity of our water sources, the assurance of safe and hygienic water, and the reliability of our food supply, are all intertwined with the climate. Continuing on the current trajectory of climate change threatens to render our planet uninhabitable. Shifts in climate patterns are anticipated to give rise to new respiratory diseases and could potentially resurrect ailments that were thought to be eradicated long ago. Furthermore, the rapid pace at which children and teenagers absorb knowledge and develop lifelong learning skills underscores the importance of these formative years. The foundation of an individual's character and cultural identity is largely shaped during these critical stages of development (12).

The earlier correct education is provided, the more effective it will be in shaping their personality. Various methods are used to enhance the knowledge of children and teenagers, including the family environment, mass communication tools, interactions with friends, the surrounding environment, and education in the classroom. Classroom education and other educational programs implemented in different settings play a crucial role in enhancing understanding of climate change and environmental issues. It is important to note that this age group represents the future decision-makers. Therefore, in recent decades, environmental education has been recognized as a vital principle for achieving sustainable development and environmental protection (13). Even the United Nations has highlighted the importance of education for sustainable development in Directive 21 (14,15).

Educational cases on climate change for students can be a valuable tool in increasing their understanding of the topic and motivating them to take action. Here are a few educational cases that can be used to engage students in learning about climate change:

1. **The Impact of Climate Change on Wildlife:** This case study focuses on how climate change affects various species and ecosystems. Students can explore the consequences of rising temperatures, habitat loss, and changing migration patterns on wildlife populations. They can also examine the role of conservation efforts in mitigating the effects of climate change on biodiversity.
2. **The Role of Fossil Fuels in Climate Change:** This case study explores the connection between the burning of fossil fuels and greenhouse gas emissions. Students can investigate the environmental and social impacts of relying on fossil fuels and examine alternative energy sources, such as renewable energy, to reduce greenhouse gas emissions.
3. **Climate Change and Food Security:** This case study delves into the relationship between climate change and global food production. Students can analyze how changing weather patterns, water scarcity, and extreme events impact agricultural systems and food

security worldwide. They can also explore sustainable farming practices and innovative solutions to ensure food availability in the face of climate change.

4. **Climate Change and Human Health:** This case study examines the health impacts of climate change, including increased prevalence of heat-related illnesses, vector-borne diseases, and respiratory conditions. Students can explore the connections between climate change and public health, as well as the importance of adaptation and mitigation strategies in protecting human well-being.
5. **Climate Change and Social Justice:** This case study focuses on the unequal distribution of climate change impacts and the concept of environmental justice. Students can explore how vulnerable communities, both locally and globally, are disproportionately affected by climate change and analyze strategies to address these inequalities and promote climate justice.

These educational cases can be used as interactive exercises, research projects, or discussion topics in the classroom. They provide students with an opportunity to critically analyze real-world scenarios, understand the complexities of climate change, and develop solutions for a sustainable future.

Conclusion

Recognizing that climate change is a global issue, it is vital to prioritize the younger generation's perspectives on environmental challenges. Given that students are the future architects of the nation, it is crucial to focus on the younger generation and their attitudes toward climate issues. Students need to understand that Earth is our shared home, and we must protect it at all costs by mitigating the impacts of climate change and preventing destructive phenomena.

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Competing interests

The authors declare no conflicts of interest or competing financial or personal relationships that could have influenced the results or interpretation of this study.

Ethical issues

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