

Climate Change Education in Afghanistan High School Curriculum: Depictions of the Causes, Impacts and Solutions

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ABSTRACT

Climate change education is crucial for equipping students with the knowledge to address environmental challenges. This study analyzes climate change education in Afghanistan's high school curriculum. Using content analysis, the research identifies climate change topics in geography, biology, and chemistry syllabi for grades 10 to 12. The study focuses on causes, impacts, and solutions to climate change and examines topic distribution across grades. The findings reveal that climate change-related topics are included in the geography, biology, and chemistry curriculums. In the geography curriculum, climate change topics are prevalent, constituting 6% of the content. However, in biology, the coverage is relatively lower at 3%. In chemistry, there is only one topic in 12th grade related to climate change. Notably, the 10th and 12th grade exhibits a more significant emphasis on climate change topics in geography and biology respectively. These findings raise important considerations for climate change education in Afghanistan. While progress has been made in integrating climate change topics into the curriculum, there is a need for further attention and balance across subject areas and grade levels. Enhancing the coverage of climate change topics, particularly in science subjects, can significantly contribute to fostering a comprehensive understanding of the issue among students. This study provides valuable insights for policymakers, curriculum developers, and educators in Afghanistan to strengthen climate change education within the high school curriculum.

Keywords: Climate Change Education, Curriculum, Mitigation, Adaptation, Afghanistan

INTRODUCTION

Climate change is undeniably one of the most critical threats facing our planet today. Its far-reaching impacts have already been felt, particularly through hydro meteorological disasters such as floods, tornadoes, landslides, and abrasions (Sofiyani et al., 2019). Afghanistan, in particular, has experienced a growing impact of climate change, ranking among the top 10 countries affected by extreme weather conditions and natural disasters, including droughts, storms, avalanches, and earthquakes (OCHA, 2024). In light of these challenges, education emerges as a crucial starting point for creating basic environmental awareness and fostering responsible citizenship. The significance of education in addressing climate change cannot be overstated. A well-rounded education equips individuals with scientific skills, futures thinking, and critical analysis, enabling them to comprehend the far-reaching impacts of climate change. By instilling a solid understanding of climate change, education empowers citizens to become effective defenders of the natural environment and the planet as a whole. Furthermore, climate change is a social issue, and it is essential to involve society in tackling this global challenge (Fuentes et al., 2020). By increasing awareness of climate change, education enables students to adapt and take appropriate actions to minimize its impacts (Deniz et al., 2021). Climate change education (CCE) is a key strategy to respond to climate change (UNESCO, 2015). Recognizing the pivotal role of education, the United Nations Framework for Climate Change (UNFCCC) in its Article 6 acknowledges the importance of education in climate change mitigation. Education creates awareness of the problem and encourages behavioral changes that are crucial for successful adaptation and mitigation strategies (UNFCCC, 1992). The literature consistently supports the notion that CCE should focus on fostering critical and creative thinking, capacity building, and engagement among youth. By providing young individuals with meaningful information and empowering them to take appropriate actions, CCE can effectively respond to climate change challenges (Stevenson et al., 2017).

Consequently, school curricula, particularly teaching and learning materials, play a crucial role in raising public awareness and promoting sustainable education. In the context of Afghanistan, this research aims to examine the presentation of basic concepts related to the causes, effects, and solutions of climate change in high school textbooks. By evaluating the content and approach of these educational resources, we can shed light on the current state of climate change education in the country. Understanding the strengths and areas for improvement in the existing curriculum will provide valuable insights for enhancing public awareness and sustainable education in Afghanistan. In this paper, we will explore the importance of climate change education, review relevant literature, and analyze high school textbooks in Afghanistan to assess the coverage of climate change concepts. By doing so, we aim to contribute to the ongoing efforts to strengthen climate change education and empower future generations to become active agents in addressing this global challenge.

MATERIALS AND METHODS

This study employs the content analysis method (Prasad, 2008) to systematically and objectively analyze the curriculum documents of the high school education system in Afghanistan. The analysis focuses on the 10th-12th grade geography, biology, and chemistry syllabi. The selected curriculum documents are the official editions released by the Ministry of Education of Afghanistan in 2011. The content analysis is conducted in the following steps:

- Category establishment: Categories are developed based on a literature review, encompassing the causes, impacts, and solutions of climate change.
- Topic identification: topics were identified related to climate change within the geography, biology, and chemistry high school curricula. Each topic is classified under the appropriate category.
- Calculation of percentages: the percentage of topics (causes, impact and solutions) calculated related to climate change.

This content analysis approach allows for a comprehensive evaluation of the presence of climate change topics within the high school curriculum in Afghanistan.

RESULTS AND DISCUSSION

Topics related to climate change on geography syllabus in 10th -12th grade

The analysis of climate change-related topics in the syllabus revealed significant findings, indicating an overall coverage of 16.20%. Specifically, the 10th grade curriculum accounted for 25.00% of climate change topics, followed by 7.40% in the 11th grade and 14.03% in the 12th grade (as shown in Table 1).

Grade	Number of topics in syllabus	Topics related to CC	
		N	%
10 th	68	17	25.00%
11 th	54	4	7.40%
12 th	57	8	14.03%
Total	179	29	16.20%

CC: Climate Change, N: Numbers

In the 10th grade curriculum, seventeen topics addressing climate change were identified. These include: Afghanistan's climate, the key factors influencing climate, temperature variations, moisture patterns, the significance of water in sustaining life, the relationship between energy and the economy, challenges of droughts and water scarcity, the importance of preserving forests and biodiversity, measures to protect water, soil, and air quality, urban air pollution, the impact of aging automobiles on air pollution, the environmental degradation caused by damaged roads and streets, the consequences of floods and strategies for protection, the effects of volcanic emissions, the primary causes of climate change, and the crucial role of the atmosphere in shaping the climate. The 11th grade curriculum encompasses four topics that address climate change. These topics include the significance of energy and its various forms, renewable and non-renewable energy sources,

the importance of water recycling, and recognizing the importance of international transportation. Moving on to the 12th grade curriculum, there are eight topics that focus on climate change. These topics cover issues such as migration patterns influenced by climate change, the impact of fossil fuels and greenhouse gases, the role of transportation in environmental sustainability, the effects of industrial activities on the ecosystem, the management of industrial waste materials, the consequences of ozone layer depletion, and the adverse effects of deforestation.

Percentage of climate change categories in the topic of geography syllabus in 10th -12th grade

In addition to the analysis of climate change topics, this study examines the content within the geography syllabus, specifically focusing on the causes, impacts, and solutions of climate change. The findings reveal that a majority of the topics in the geography syllabus primarily address the causes of climate change, accounting for 55.17% of the content. The aspect of climate change impacts represents 20.69% of the topics, while climate change solutions constitute 24.14% (as depicted in Table 3). This distribution is concerning as the primary objective of climate change education is to foster an understanding of climate change and its consequences, along with cultivating attitudes and awareness to mitigate the impacts of climate change.

Table 2. Composition of CC aspects in the topics of Geography syllabus.

Category	Grade			Total	
	10 th	11 th	12 th	N	%
Causes of CC	9	3	4	16	55.17%
Impacts of CC	2	0	4	6	20.69%
Solutions of CC	6	1	0	7	24.14%
Total	17	4	8	29	100.00%

CC: Climate Change, N: Numbers

Topics related to climate change on biology syllabus in 10th -12th grade

The analysis of climate change-related topics within the biology syllabus yielded significant findings, indicating an overall coverage of 7.30%. Specifically, in the 10th grade, the percentage of topics related to climate change was 2.08%, while in the 11th grade, no specific topics were identified. However, in the 12th grade, the coverage of climate change topics was notable, accounting for 17.65% (as shown in Table 3).

Table 3. Biology syllabus related to CC.

Grade	Number of topics in syllabus	Topics related to CC	
		N	%
10 th	48	1	2.08%
11 th	62	0	0.00%
12 th	68	12	17.65%
Total	178	13	7.30%

CC: Climate Change, N: Numbers

In 10th grade, there is only one topic related to climate change i.e. recycling (water, carbon and nitrogen). In 12th grade, there are twelve topics related to climate change including: the greenhouses effects, acid rain, ozone layer depletion, prevention of ozone layer depletion, solid pollutions, method for vanishing solid pollutions, water pollutions, recycling water, underground water pollution, air pollutions, how to control air pollution, solving environmental problems.

Percentage of climate change categories in the topic of biology syllabus in 10th -12th grade

This study also analyzes the content of climate change cause, impact, and solution on topics within the biology syllabus. The result is the majority of the topics in the biology syllabus are dominated by the causes and solutions aspect with the percentage of 46.15% and 38.46% respectfully. The aspect of climate change impacts is 15.38% (see table 3). This condition is very apprehensive. Because the main objective of climate change

learning is to build cognition on climate change and its consequences, also to shape attitudes and awareness through various efforts to reduce the impacts of climate change.

Table 4. Composition of CC aspects in the topics of Biology syllabus.

Category	Grade			Total	
	10 th	11 th	12 th	N	%
Causes of CC	1	0	5	6	46.15%
Impacts of CC	0	0	2	2	15.38%
Solutions of CC	0	0	5	5	38.46%
Total	1	0	12	13	100.00%

CC: Climate Change, N: Numbers

Remarks: In chemistry, 10th -12th grades there is only one topic in grade 12th i.e. environmental pollution from artificial or synthetics polymers. Totally there are 145 topics in chemistry syllabus. So, there is only 0.69% topic related to climate change.

Total percentage of topics and categories (causes, impacts & solutions) related to climate change

There are, 179 topics in geography, 178 topics in biology, and 145 topics in chemistry. Among these topics, 43 were found to be directly related to climate change, with 29 topics in geography, 13 topics in biology, and 1 topic in chemistry addressing this crucial issue. Furthermore, out of the climate change-related topics, 23 focused on causes, 8 explored the impacts, and 12 delved into potential solutions to address climate change as shown in (Figure 1).

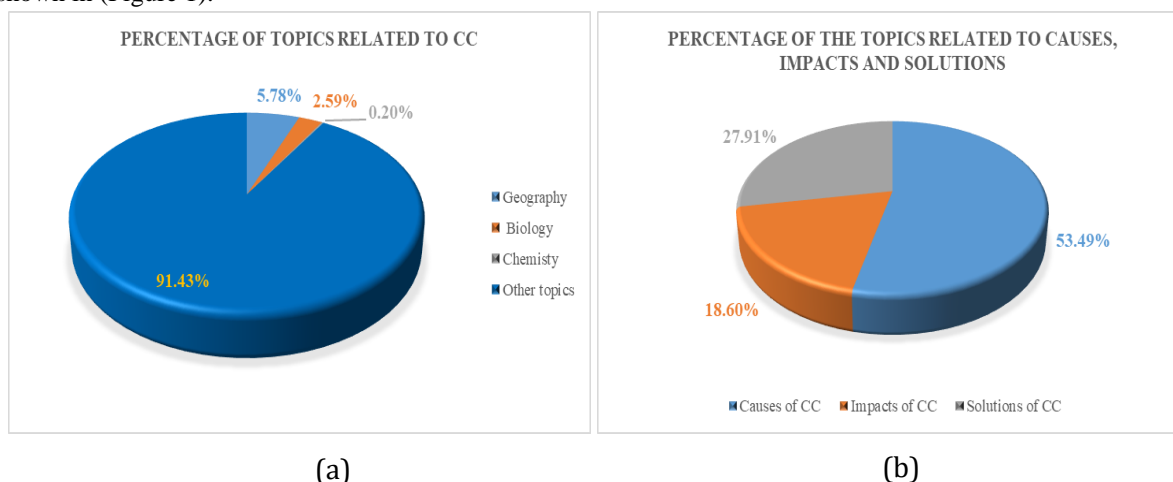


Figure 1. (a) Percentage of topics related to climate change and (b) Percentage distribution of topics related to causes, impacts, and solutions within the high school curriculum.

The low percentage of climate change topics within the syllabus is a matter of concern. This situation is particularly unfortunate considering the significant role that geography and science subjects play in shaping students' cognition and attitudes towards climate change. Geography, in particular, adopts an environmental approach that is characteristic of geographical studies and sets it apart from other disciplines (Sofiyani et al., 2019). While geography covers numerous topics related to climate, not all of them directly address climate change. Science subjects, which are crucial for understanding and addressing environmental challenges, also exhibit limited coverage of climate change (Chang & Pascua, 2017). It is disheartening to note that there are no topics related to climate change in the science curriculum for classes 10 and 11. In the 12th grade, only one chapter is dedicated to climate change, and in the field of chemistry, only one topic in grade 12 touches upon this critical issue. These observations highlight the need for a more substantial integration of climate change topics across geography and science subjects, ensuring students receive a comprehensive understanding of climate change and its implications. Addressing this gap can significantly contribute to fostering environmental awareness and empowering students to take action towards a sustainable future.

CONCLUSION

This research sheds light on the state of climate change education within the high school curriculum of Afghanistan. Through a comprehensive analysis of the geography, biology, and chemistry syllabi for grades 10th to 12th, we have gained valuable insights into the presence of climate change-related topics. In the geography curriculum, there is a notable emphasis on climate change topics, covering aspects such as causes, impacts, and solutions. However, the biology curriculum has a relatively lower coverage of climate change topics, and there is only one topic in chemistry and non in others. Furthermore, the distribution of climate change topics across grade levels reveals varying levels of attention. In 12th grade only last chapters focus on climate change topics in both geography and biology. It is crucial to recognize the significance of climate change education in equipping students with the knowledge, skills, and attitudes necessary to tackle environmental challenges. This research provides valuable insights to inform curriculum development, policy decisions, and educational practices in Afghanistan. By addressing the identified gaps and strengthening the coverage of climate change topics, educators can play a vital role in raising awareness, empowering students, and nurturing a generation capable of addressing the complex challenges of climate change. Ultimately, the integration of climate change education within the high school curriculum not only enhances students' knowledge but also shapes their attitudes and encourages proactive engagement in mitigating and adapting to climate change. Education is a powerful tool to foster a sustainable and resilient future, and it is our collective responsibility to ensure that climate change education receives the attention it deserves within the Afghan high school curriculum.

REFERENCES

- Chang, C. H., & Pascua, L. (2017). The curriculum of climate change education: A case for Singapore. *Journal of Environmental Education*, 48(3), 172–181. <https://doi.org/10.1080/00958964.2017.1289883>
- Deniz, M., İnel, Y., & Sezer, A. (2021). Awareness Scale of University Students About Global Climate Change. *International Journal of Geography and Geography Education (IGGE)*, 102–111.
- Fuertes, M. Á., Andrés, S., Corrochano, D., Delgado, L., Herrero-Teijón, P., Ballegeer, A. M., Ferrari-Lagos, E., Fernández, R., & Ruiz, C. (2020). Educación sobre el Cambio Climático: una propuesta de una herramienta basada en categorías para analizar la idoneidad de un currículum para alcanzar la competencia climática. *Education in the Knowledge Society (EKS)*, 21(0), 13. <https://doi.org/10.14201/eks.21516>
- OCHA. (2024). *Afghanistan: The alarming effects of climate change | OCHA*. Unocha.Org. <https://www.unocha.org/news/afghanistan-alarming-effects-climate-change>
- Prasad, B. (2008). Research methods for social works. *Css.Ac.In*. [http://www.css.ac.in/download/deviprasad/content analysis. a method of social science research.pdf](http://www.css.ac.in/download/deviprasad/content%20analysis.%20a%20method%20of%20social%20science%20research.pdf)
- Sofiyani, S., Aksa, F. I., & Saiman, S. (2019). An analysis climate change of the curriculum in Indonesia. *Journal of Physics: Conference Series*, 1321(2). <https://doi.org/10.1088/1742-6596/1321/2/022121>
- Stevenson, R., Nicholls, J., Perspectives, H. W.-C., & 2017, undefined. (2017). What is climate change education? *Springer RB Stevenson, J Nicholls, H WhitehouseCurriculum Perspectives, 2017•Springer*, 37(1), 67–71. <https://doi.org/10.1007/s41297-017-0015-9>
- UNESCO. (2015). *Not just hot air: putting climate change education into practice*. <https://unesdoc.unesco.org/ark:/48223/pf0000233083>
- UNFCCC. (1992). *United Nations Framework Convention on Climate Change*. 62220. <https://bit.ly/39nAtZ6%0A>