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Exploring Student Perceptions of climate change awareness: A case study of one University in South Africa

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Abstract
This paper aimed to investigate the awareness of climate change among students at a South African university. Climate change is a global issue resulting from human actions and has significant environmental consequences. Therefore, it is essential to gain an in-depth understanding of the level of awareness among emerging leaders to address climate change effectively. The study employed a qualitative approach with a case study design to explore students' perceptions of climate change awareness. A purposeful sample of eight students was selected for semi-structured interviews. The collected data were analyzed thematically to identify patterns and emerging themes. The findings indicate that students have limited knowledge of climate change, which includes its causes and effects. However, they possess a deeper understanding of adaptation and mitigation strategies. Furthermore, universities fail to address climate change through comprehensive education and awareness campaigns, contributing to students' limited understanding. This study concludes that the lack of awareness and inadequate institutional support contribute to the knowledge gap regarding climate awareness. In addition, a superficial understanding among students as future leaders threatens effective climate action. This conclusion implies that universities must implement strategies to educate and create climate change awareness for students. Consequently, this study recommends universities integrate climate change into their curriculum to promote awareness. In addition, universities should explore pedagogical approaches to deepen students' understanding of interventions to mitigate climate change. Overall, this study contributes to enhancing students' understanding of the impact of climate change.

Keywords: Awareness, Climate Change, Community, Students, University, Higher Education.

Introduction

In today's world, climate change (CC) is undeniably a significant threat to people across different groups and geographical regions. Numerous studies have examined how human activities directly and indirectly impact the climate and natural resources (Abrahms et al., 2023; Pearson, eta2023). These changes result in detrimental health effects and adversely impact individuals' well-being (Álvarez-Nieto et al., 2022). Biancardi et al. (2023) indicate that various organizations, including the Intergovernmental Panel on Climate Change (IPCC) and the International Organization for Migration (IOM), have developed guidelines aimed at enhancing sustainability to combat climate change and its related challenges. These guidelines highlight the importance of raising awareness to address climate change.

Increasing awareness of climate change's negative impacts and causes is crucial for its integration into policy planning, projects, and everyday activities. This awareness can encourage society to engage in the mitigation of climate change (Crawley, Coffé & Chapman, 2022; Bayraktar et al., 2024). Human behavior significantly influences climate change's progression and efforts to combat it (Smederevac-Lalic et al., 2020). Promoting climate change awareness among students at higher education institutions, such as universities, can be vital in enhancing this awareness across communities.

The German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety, and Consumer Protection released a report on environmental sustainability (Has, 2021). This report emphasizes higher education institutions' role in addressing the urgent problem of climate change. The report pointed to the awareness of climate change, which is being imparted to students at certain German universities. One example is the Technical University of Munich, which works to ensure that all aspects of university operations are environmentally responsible. This includes reducing waste, energy efficiency, and environmentally friendly spending (Dietrich et al., 2021).

In comparison, the African Climate and Development Initiative (ACDI) in South Africa, as noted by Steenkamp (2018), seeks to inform communities about climate change and how this worldwide ecological crisis impacts the African continent. The effort concerning rain climate awareness has resulted in the development of several climate change programs. These programs are designed to increase the awareness of teachers and community members to find solutions to climate change challenges (Steenkamp, 2018). Mathebula and Pretorius (2020) emphasize the need to include environmentally friendly practices in the university curriculum to respond to the climate change crisis in South African communities. Such an initiative would help the university raise awareness and support communities and individuals in mitigating climate change challenges.

Research has shown that some universities contribute to raising awareness of climate change in their communities. For instance, a study conducted by Nyerere et al. (2021) asserted on the involvement of universities in future projects across Africa within their curricula. The goal of their study was to expand research in biodiversity strategically and to initiate sustainable development programs. Similarly, Asiaei et al. (2022) findings indicated that, globally, a number of universities have implemented a sustainability strategy and produced a sustainability report. Their data provide information on the environmental performance and impact on communities. Several studies have been conducted regarding climate change in general. However, there seems to be a limited understanding of climate change awareness, especially among South students in South African universities. As a result, this study sought to contribute to climate change

awareness. The objective of the study was to explore the perceptions of climate change awareness in South African universities.

Theoretical Framework

The theory that frames this study is Bandura's Social Learning Theory (SLT). The Social Learning Theory, which was proposed in 1977, suggests that people attain knowledge, attitudes, and behaviors by observing and emulating others (Bandura, 1977). SLT as postulated by Bandura (1977) focuses on the role of observational learning, modelling, and reinforcement that influence people's behavior. The theory emphasizes that observational learning occurs when there is direct observation of experienced individuals or exposure to the media (Bandura, 1977). Modelling, as described by Bandura (1977), involves acquiring new behaviors by imitating others. Reinforcement, as explained by this theory, whether direct or indirect, affects the behavior of individuals by either strengthening or weakening. Similarly, individual self-efficacy demonstrates self-belief in their ability to transform their behavior through actions (Bandura, 1977). University students can develop environmentally conscious behaviors by observing others and experiencing the consequences of their actions toward climate change.

Literature Review

The research title of the study was "Exploring Student Perceptions of climate change awareness", and the research question was "How do university students understand climate change, and what factors influence their awareness of issues relating to climate change?". These three themes will guide the literature review of this study. They include:

- Student Perceptions of Climate Change
- Factors that influence climate change awareness among university students
- Strategies for students' awareness of climate change

Student Perceptions of Climate Change

In the contemporary world, climate change perception among students is affected by educational attainment, personal exposure to the issue, and societal influences. Kroufek et al. (2022) suggest that these perceptions impact students' engagement with climate change issues. University students strongly understand climate change and its associated effects (Molthan-Hill et al., 2022). However, the student's awareness of climate change is often associated with emotions. This is echoed by Ogunbode et al. (2022), who found that South African university students experience anxiety about climate-related issues. In institutions of higher learning, students not only acquire climate change information but pursue to contribute to its discourse. Furthermore, the opinions of university students about this global issue (climate change) depend on their awareness levels (Muhammad et al., 2022). This awareness, in turn, plays an important role in shaping their cognitive frameworks related to climate change.

Moreover, higher learning institutions serve as ground for influencing students' views concerning climate change. According to Brandli et al. (2024), university support increases students' willingness to act on environmental issues. Therefore, integrating climate change topics into the universities' programs is important, as it empowers students to function as effective agents of change. This is supported by İncesu and Yas (2023), who stated that students need to be educated about climate change and its associated effects on humans and the environment. Although some students may have basic knowledge about climate change, educating them can contribute to their ability to address its problems.

Based on the findings above, it is obvious that, the perceptions and attitudes of students in the higher education toward climate change are influenced by their personal experiences. Kılıç et al. (2024) postulate that students exhibit some awareness of climate change. However, their knowledge about it depends on their level of education. This is supported by Mugambiwa and Dzomonda (2018), who posit that students disseminate climate change information to members of their communities. This finding shows the ability of students to exhibit and share knowledge gain in their education.

Factors that Influence Climate Change Awareness Among University Students

In the ever-changing environment globally, different factors influence the awareness of climate change among university students. Institutional support for climate education is certainly a factor. This is concurred by Brandli et al. (2024), who state that students in higher institutions that uphold climate change education turn to have a positive approach to handling climate change-related issues and act sustainably. Adding climate change topics into the university's activities and educating students about it is crucial. This can inspire students to act sustainably and can assist in raising awareness among the university community (Alemayehu et al., 2024).

Additionally, studies such as Leal Filho et al. (2023) and Kumar et al. (2023) have revealed that students who are exposed to climate-related issues such as floods and extreme weather conditions are conscious of climate change. Also, Kroufek et al. (2018) posit that areas where the effects of climate change are mostly felt affect students' behavior. These students display higher awareness regarding climate issues than their peers in other regions. This shows that the individual's understanding of climate-related issues can expand their knowledge and perception of the related problem. Therefore, educational programs need to incorporate real-world examples and compelling case studies.

Gender differences play a role when talking about climate change awareness among students. According to Hampton and Whitmarsh (2023), female students show concern and have the zeal to know more about climate change than their male counterparts. This has made them more conscious about climate-related issues than the males. More so, research has shown that women consider climate change and its effects as a severe burden on the environment than men (Hampton & Whitmarsh, 2023). These demographic differences are important when crafting educational interventions that will help students in their different views concerning climate change.

Strategies to Improve Students' Awareness of Climate Change

In the quest to enhance climate change awareness among students, universities can integrate experiential learning, including community participation and climate action projects, into their programs. Kolenatý et al. (2022) posit that when students are involved in climate-related activities, their awareness levels are likely to increase. These make them make conscious decisions when dealing with environmental issues. Universities can serve as centers for climate change knowledge, helping to share information with nearby communities. This can be achieved by providing students with hands-on, real-world experiences related to climate issues (Potts, 2024).

Furthermore, incorporating climate change themes into different university learning programs can help enhance awareness. This is supported by Khalo and Damoah (2023), who state that interdisciplinary approaches to climate education can increase university students' awareness of climate change and its undeniable effect on societies and the environment.

In addition to the above, a culture supporting campus climate change issues is critical. Kumar et al. (2025) state that universities are considered knowledge centers. Therefore, they can create an environment where students are empowered to contribute to finding climate solutions. This can be achieved when students share concerns, propose innovative ideas, and drive meaningful change. This is supported by Bingley et al. (2022), who propose that climate change anxieties among students can be minimized through effective engagement on campuses of universities. Encouraging open discussions about ever-changing climatic conditions involving all university students can enhance their knowledge about this global menace. Students' climate awareness makes them contribute to solutions to address climate change problems.

Methods

In this study, the researcher used a qualitative research approach with a case study design to explore student perceptions of climate change awareness. According to Kopec (2023), using a qualitative approach with a case study design is critical because it allows the researcher to attain an in-depth understanding of the phenomenon being studied in a social context. The population of the study was all students, lecturers, and staff of the university in South Africa. The sample included eight university students who were purposively selected. A small sample size was used because it allowed the researcher to focus on gaining an in-depth understanding of complex issues and gathering rich and detailed data about the phenomenon being studied (Tutar et al., 2024).

The data collection instrument employed in this study was a semi-structured interview. Semi-structured interviews are used in qualitative studies because they allow for the in-depth exploration of complex subjects and direct conversation with participants (Bush et al., 2020; Gray et al., 2020). Thematic data analysis was used to determine patterns and emergent themes. Maree (2021) and Belotto (2018) assert that thematic analysis in qualitative research is effective because it allows for the development of emergent themes from a set of data.

Ethical consideration was ensured by obtaining ethical clearance from the university where the study was conducted. The objective of the study was to explain to the participants, and they were made to sign a consent form. In addition, participants were made to understand that the study does not pose any harm and that they can withdraw their participation at any time if they feel uncomfortable. A possible limitation of this study was that it was conducted over a short time frame and focused only on one university.

Findings

The research question of the study was "How do university students understand climate change, and what factors influence their awareness of issues relating to climate change?". To respond to this research questions three themes emerged from the data analysis. The themes are as follows:

- Theme 1: Students personal experiences shape their awareness of climate change
- Theme 2: The education and information from the media influence students perceptions of climate change
- Theme 3: The socioeconomic and cultural background determine the importance of climate change.

Belowe are the interpretation of these themes:

Theme 1: Students Personal Experiences Shape their Awareness of Climate Change

This theme demonstrates students' understanding of climate change and how they are affected by their experiences. Some of these experiences include exposure to harsh weather conditions, changes in the environment in the communities, and the way in which they observe nature. These experiences determine students' attitudes toward climate change. In addition, the role of the university in fostering climate change awareness seems to be limited. Participant ST3 was of the view that, the upbring in the rural area community influenced their awareness of climate change. ST3 mentioned that;

> *ST3: "In my village where I grew, we experience limited rain fall and this. The drought we experience in the year destroys our farms as a result we experience shortage of food in the community". In the university not so much emphasis is made with regards to climate change. I haven't seen climate change awareness program in the campus or in the curriculum*".

Contrastingly, Participant ST5 seems to have limited experience with climate change. ST5 said;

> *ST5: "I hear of climate change and see changes in the weather, but I have personally not experienced extreme change in the weather that causes any sort of personal damage to me or my community. For me I feel the idea of climate change is foreign to me. In my university experience, I don't think enough awareness is created in our campus*".

Participant ST7 explained she felt climate change was so exaggerated in the media until the occurrence of flood in her place of residence. ST7 highlighted that,

> *ST7: "I have always thought that climate change was being exaggerated and never bothered myself to know about it. Until a serious flood in my locality destroyed people's properties and farms. That is when I became curious to know more about it. For me I don't think my university has done much to give even the basics about climate change*".

These participants' findings demonstrate students' experiences and knowledge about climate change. The responses from the participants reveal that students have significant exposure to environmental changes. Some of these changes include changes in the weather, the occurrence of droughts and floods, and overheating. These changes in the climate influence student awareness and attitude towards climate change. In addition, the university's role in creating awareness of climate change to students has been very limited. This could affect students' ability to create awareness of climate change in their communities.

Theme 2: The Education and Information from the Media Influence Students' Perceptions of Climate Change

The data collected from the participants to address the research questions show that university courses and media exposure influence students' awareness regarding climate change. However, university students face irrelevant information and deceptive phrasing about this global problem, climate change, which impacts students' opinions and varying understanding of climate. Participant ST2 believed that some courses offered at the university have positively impacted their understanding of climate change. ST2 said that;

ST2: "I'm studying environmental science at the university, and this program has enlightened my knowledge about climate change. I'm better convinced that human activities are driving forces of climate change. But I don't think those who don't do this course understand climate change well".

Participant ST4 pointed that they get some information from the media but not sure of its authenticity. This echoed in the verbatim below;

ST4: "Most of the time, I hear and see a lot of climate change debates on the television and other social media platforms. However, I found it challenging to get its genuineness, and it is very difficult to know which information from these media is true. I think people just overstress on this issue of climate change".

Participant ST6 is in support of participant ST4's view. This emphasised in the extract below;

ST6: "*I always hear a lot of information about climate change from the media. The media talk about floods, extreme temperatures, and tsunamis happening in other parts of the world. This is information that makes me feel like our environment is ending. However, some academics say that we can do something collectively to preserve the environment. I really don't know who to believe".*

The findings from the participants revealed the role of education and medial play in influencing the knowledge people have on climate change. Moreover, the responses from the participants proved that, there are conflicting thoughts and ideals and these have effects on the public understanding on issues concerning climate change. Individuals' education background give them knowledge of climate change and its associated effects on the environment. However, these findings pointed lack of accurate information from the media which affect their behaviour towards climate change. This conflicting views highlights that, accurate information accessibility is crucial to close the gap between academic knowledge and public understanding of climate related issues.

Theme 3: The Socioeconomic and Cultural Background Determine the Importance of Climate Change

This theme shows that students' socioeconomic and cultural contexts guide their actions towards climate change. Those interviewed revealed that some people put their basic needs before climate change, whilst others, especially those who are privileged to come from wealthy backgrounds, view climate change as a global threat that needs attention. Participant ST1 was of the view that people are concerned about their livelihood and how to feed their families rather than climate change. ST1 said;

ST1: "*In the area where I live, the community members are much concerned about how they could get employed and be able to provide for their families. They show little or no concern about climate change. To be honest with you, I don't care about things in the future when I find it difficult to survive".*

Contrastingly, participant ST8 seems to have concerns about environmental sustainability. This is evident in verbatim below;

> ST8: *"In my family, we know the importance of protecting the environment. We recycle waste materials and take energy conservation seriously. Climate change is real, and we have to protect the environment from further damaging".*

Participant ST5 concurs with Participant ST8. This is seen in the comment below;

> ST5: *Frankly speaking, climate change is a serious problem for the whole world. It's causing problems to our landscape and damaging our properties. I think the government should act to help solve the climate problem as we also do our part".*

The findings from the participants reveal that different ideas and thoughts are around environmental issues. Socioeconomic considerations influence these thoughts and ideas concerning the environment. The participants revealed that some students concentrate more on survival in their daily endeavours. In contrast, others know the need to put the environment at heart and act proactively to protect it from harm. This shows that, the promotion of widespread environmental action necessitates the substantive mitigation of socioeconomic inequities and the comprehensive enhancement of public environmental knowledge. In addition, the findings from the participants indicate the importance of an integrated strategy that combines individual effort with government support to combat climate change effectively.

Discussions

The findings of the study revealed that the understanding of university students about climate change is affected by a number of experiences. These experiences include educational background, socioeconomic background and media exposure. Participant ST3 emphasised this by saying that *"In hometown where I was brought up, we usually experience shortage of rain. This result in my community experiencing drought and famine in the community for most of the months (ST3)".* This finding shows how harsh changes in the environment like drought and famine can shape the awareness of climatic challenges in the community. The findings of participant ST3 aligns with the results of Leal et al. (2023) and Kumar et al. (2023), which showed that students who have experiences of issues with the weather and its effects on the environment are much more aware of climate change.

Additionally, it was discovered from the findings that university students experience a climate change awareness gap because they are not exposed to climate-related activities. This makes them not act responsibly to combat this global menace. Participant ST5 highlighted this by stating that *"All my life, I have never come into contact with harsh conditions of like heavy rainfall and bad storms that can cause damage to properties in the community where I live. Though I have heard about severe climatic changes (ST5)".* This shows how individuals who have not felt the effect of climate change see it as an unreal and distant event that is not to be bothered about. This highlights the significance of experiential learning as suggested by Kolenatý et al. (2022). These scholars believe experiential learning is crucial for connecting theoretical information to personal significance.

Educational and media influences were further discovered in this study to play an important role in influencing how university students view climate change. This is supported by ST2, who stated, *"I am an environmental science at the university. And to be honest, this program has enlightened my knowledge about climate change issues (ST2)".* This shows that education plays a crucial role in shaping individuals' knowledge. In contrast, ST4 pointed out a concerning issue about information about climate change that the media disseminate. ST4 said *"Most of the time, there have*

been numerous discussions on climate change on the television, different radio stations and YouTube. I think I have no idea whether the information they give to people are genuine or not..... I don't know (ST4)".

This finding is in line with Muhammad et al. (2022) who posited that false information and contradictory information tend to affect students and the general public's knowledge about climate issues. According to Bandura's Social Learning Theory (SLT), students can students acquire knowledge through observation and media exposure ((Bandura, 1977). The contracting views presented by various media sources as echoed by ST6, who express "*In many instances, I hear people debating and given all sorts of commentary about climate change. Now, I don't who to believe (ST6).*" This further indicates that, higher learning institutions as an information hub promptly provide reliable information about climate-related matters. This finding additionally supports the importance of institutional support, as suggested by Brandli et al. (2024).

Also, it was revealed from the study that, socioeconomic and cultural backgrounds influence individual perceptions of climate change. This shows how individuals give different attention to addressing climate-related issues. This is highlighted by ST1, who stated, "*You know, people are facing difficulties in my community. Most of them are only concerned about what to do to provide for their families (ST1)*". This indicates a focus on immediate needs at the expense of long-term environmental concerns. On a contrasting view, ST8, who is from a family that is very mindful of the environment, said, "*In my family, we understand the importance of protecting the environment. We recycle waste materials and take energy conservation seriously ST8*". This shows that students' attitudes towards climate change can be affected by socioeconomic inequities.

Addressing these inequities is crucial for fostering widespread environmental engagement. Furthermore, it is essential as it helps promote public environmental awareness. This result from the study supports the need for integrated strategies from individual efforts with government support. Bandura's Social Learning Theory offers a theoretical lens for understanding how students' perceptions are formed and influenced. According to the theory, observational learning, modeling, and reinforcement, as Bandura (1977) explained, play critical roles in shaping students' behaviors and attitudes toward climate change.

In creating an environmentally friendly space for students, universities as knowledge hubs can act as a catalyst. This can assist students of higher learning institutions to exhibit sustainable practices and strengthen climate-conscious actions. Moreso, higher learning institutions can enhance students' awareness and engagement with climate change by integrating experiential learning, interdisciplinary approaches, and cultivating a supportive campus culture, (Khalo & Damoah, 2023; Kumar et al.,2025). This, in turn, will help students build the self-efficacy needed to create meaningful change within their communities.

Conclusions

This study investigated university students' knowledge about climate change and the factors influencing their awareness. The emerging themes were personal experiences, education and media influence, and socioeconomic and cultural backgrounds. Climate change awareness among students of higher learning institutions is influenced by their exposure to harsh weather events such as heat waves, lack of precipitation, and heavy rainfall. These experiences change university students' attitudes towards climate change and its associated problems. The study found that the university does not promote climate change awareness much. The university does not have programs that aim to address climate change issues. These issues inform us that incorporating climate change topics into the university's program is critical.

Additionally, the views and perceptions of students concerning climate change are influenced by their educational and media exposure. University students who undertake courses

in environmental science have enhanced knowledge about climate change and its related effects. However, students are exposed to the media, which sometimes presents differing and confusing information about this menace (climate change). The media's contradictory information confuses students about the climatic changes and the harsh effects that might have on our environment and humans. Furthermore, students' socioeconomic and cultural circumstances affect their urgency on climate change. The study also found that students from deprived backgrounds prioritize their immediate survival needs over long-term environmental concerns. Therefore, the issues of socioeconomic inequities must be addressed to enhance climate education

Recommendations

The following were the recommendations from the researcher:

Recommendation for Universities

From the study, it could be recommended that infusing climate change topics into various university courses is important. Therefore, universities should integrate climate change education into their academic programs. Moreover, universities should encourage climate awareness programs such as workshops and seminars. Universities should encourage their students to participate in climate change discussions. Also, universities should collaborate with climate scientists, NGOs, and government agencies to offer students accurate, up-to-date information and practical solutions for addressing climate challenges.

Recommendation for Lecturers

In order to bring students to the fore to help address climate change issues, lecturers at universities should embrace experiential learning. They could do this by utilising practical examples, case studies, and simulations in their lessons. This could enhance climate change's relevance and influence students' knowledge about the related issue. Adding on to the above, lecturers, as specialists in different programs, should encourage students to be critical thinkers. They should assist students in evaluating media sources critically and distinguishing between credible and misleading information about climate change. Moreover, lecturers should team up with colleagues from different university departments to design courses that address climate change from multiple perspectives, fostering a holistic understanding of the issue.

Recommendation for Curriculum Developers

In creating awareness of climate change and expanding the knowledge base among students, it is recommended that those who develop the programs of study at the university level should introduce mandatory climate change modules. This mandatory module could be credit or non-credit-bearing and should also integrate practical solutions, such as hands-on projects, community outreach, or sustainability initiatives.

Recommendation for Students

In the fight against climate change, the study recommends that students of higher learning institutions be involved in climate change initiatives at universities. This could broaden their knowledge about climate change. Students are also encouraged to use reliable academic and scientific sources for climate change information. This will minimize misleading information and thus enhance their understanding of climate and its related activities.

Contributions

This study contributes to the literature on climate change education. The study investigated students' climate change awareness and found how personal experiences, education,

media, and socioeconomic factors influence their understanding. The results from this study assist universities, educators, and policymakers in developing strategies to enhance climate literacy and student engagement. By addressing identified gaps, universities can empower future generations with the essential knowledge and skills to confront climate change and the problems it has on societies.

Limitation

This study focused on only universities in South Africa. Also, only eight students were selected to be the study's participants. As this allowed for an in-depth exploration of student perceptions, the results may not be the same if a similar study were conducted in other universities due to the sampled population's unique social, cultural, and environmental contexts.

Suggestions For Future Studies

The authors propose that researchers could conduct further studies by expanding the sample size and including participants from other universities. This will enhance the generalizability of findings. More so, researchers could go into a study that investigates differences in awareness and attitudes between institutions offering valuable insights for developing context-specific strategies to improve climate change education.

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