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Knowledge, interest, and engagement of Science education undergraduates in climate change and mitigation actions in Imo State, Nigeria

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ABSTRACT

This study examined the knowledge, interest, and engagement of Science Education Undergraduates in Climate Change and Mitigation actions in Imo State, Nigeria. The relationships existing among knowledge, interest and climate engagement was specifically studied. This study adopted a descriptive survey and a correlation design. Using a researcher-made 3-sectioned instrument, the researchers collected data from the respondents. To answer the research questions, frequencies, percentages, pie charts, mean scores, and standard deviations were used while the hypothesis was tested with Pearson r statistics at a 0.01 significance level. From the major findings, it is seen that 54% of the sampled students demonstrated high knowledge of climate change while 22% and 24% demonstrated moderate and low knowledge of climate change respectively, high climate interest levels exist among the respondents (mean =3.27), majority of the students participate in personal actions which help to mitigate climate change effects such as changing their lifestyle (84.90%), considering environmental impacts in choice of goods (93.00%), water conservation (91.80%), planting of trees and flowers (79.70%) and waste recycling (70.90%), there is low involvement of the undergraduates in online and offline climate change and climate change mitigation awareness (19%), 67% of the respondents engage in climate change mitigation actions to a high extent, 22% of the participating undergraduates have moderate engagement levels in climate change mitigation actions while 11% of the respondents have low engagement levels in climate change mitigation actions, high and significant relationships exist between climate change knowledge and climate interest among the undergraduates ($r= 0.750$, $p<.05$); significant relationship also exists between interest in climate change/mitigation actions and engagement in climate change actions ($r=0.323$, $p<.05$) while the relationship between knowledge of climate and engagement in climate change mitigation activities is low and non-significant ($r=0.117$, $p>.05$). The findings imply that the use of digital tools to create climate change awareness should be greatly emphasized by lecturers, as this will promote undergraduates' interest and digital participation in climate actions and universities should incorporate climate change topics into various courses, making environmental knowledge a fundamental part of students' academic experience.

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INTRODUCTION

Climate change is seen as a continuous alteration in the forms of weather and temperature, which occurs due to the overheating of the earth's surface temperature for an extended period. Without a doubt, climate change has become a huge concern for many as it is gradually disrupting human and animal lives around the world. Climate change signifies an arduous worry to the global community, and the youths, of which undergraduates in tertiary institutions make up a good percentage of their population, shoulder the burden of its effects (Deshiana, Sriyanti & Ismet, 2022).

The ever-increasing global climate emergency stresses the need for quick and multiple mitigation strategies, underpinning the importance of comprehending the levels of knowledge, interest, and engagement/participation of undergraduates who represent a very fundamental aspect of the world population in shaping future environmental results (Carrillo-Nieves et al., 2024). Recently, there have been youth movements and demonstrations on climate change in many developed countries. While much awareness has been raised concerning climate change, it is pertinent to note that knowledge of the term "climate change" varies widely among young people.

Many undergraduates in higher institutions have a good grasp of climate change. However, some gaps have been recorded in the understanding of climate change among undergraduates (Okafor et al., 2024). It is vital to explore undergraduates' levels of comprehension regarding climate change and their levels of concern and participation in initiatives that mitigate climate change. In this generation bedevilled by the strong impacts of climate change, universities and other higher institutions have a pronounced role in equipping students with the relevant literacy and drive to contribute in a meaningful way to climate actions (Carrillo-Nieves et al., 2024). The integration of interdisciplinary programs in universities that lay a strong emphasis on climate change education remains an important building block for improving literacy, interest, and participation in climate change mitigation among undergraduates (Birolo & Carvalho, 2024). Clarke-Crespo et al. (2021) highlighted that courses on climate change introduced in some universities showed that students without prior interest could gain significant understanding and skills related to climate change through structured learning experiences. They further noted that increased motivation and perception of climate change was as a result of improved comprehension of the subject matter. Educational initiatives are important building blocks for activating interest and engagement/participation of undergraduates in climate change mitigation activities. These efforts not only enhance awareness but also empower students to take meaningful action against climate change.

With studies showing good knowledge levels of climate change (Wan, Hassan & Rui, 2024) it is also clear that there may be low literacy of mitigation methods for climate change (Birolo & Carvalho, 2024). Naturally, it is expected that high climate change literacy levels would lead to increased interest and engagement or participation in climate change mitigation activities. Climate activism on social media, which has sprung up on account of increase in climate change literacy levels has been seen to significantly influence undergraduate participation in climate change mitigation. However, this is not always true.

Islam and Lelin (2023) highlighted student activism on Twitter as a crucial tool influencing undergraduate participation in climate change mitigation activities. Wielk and Standlee (2021) also recorded that climate activism is higher and more resounding among youth through the maximum utilisation of social media platforms and other technological tools. Young activists who are knowledgeable about climate change actively share their knowledge on social media and use such media to foster a sense of mobilization and agency about issues of the environment (Wielk & Standlee, 2021). In addition to having interest in climate change, Newton and Romkey (2024) noted in research on undergraduate engineering students that that climate anxiety among students can drive engagement in sustainability efforts, indicating a complex relationship between emotional responses and proactive behavior.

Engagement in climate change mitigation actions varies among undergraduates in different countries. Alfred and Sivarajah (2021) in a study on climate action among undergraduates, noted that undergraduate students engaged in the Active Citizens programme (a climate change activism programme) conducted projects addressing climate change, enhancing their motivation and awareness. The findings revealed that these projects contributed to both

mitigation frameworks which in turn foster active engagement in climate mitigation actions among the youth. However, one must acknowledge that sometimes, although exposed to knowledge of climate change, engagement levels in climate change mitigation actions may be low.

Nigeria is particularly vulnerable to the effects of climate change. The involvement of youth in fighting climate change is indispensable. Ayalande and Jegede (2016) carried out a study among Nigerian University graduates on their knowledge on climate change and recorded that most respondents showed a good knowledge of climate change, with many expressing significant concern about its potential impacts on various sectors of the Nigerian economy, particularly agriculture. Similarly, Aliyu (2023) assessed the readiness of students at a Polytechnic in Bauchi State, Nigeria, to participate in climate change activism and reported that 82% of the population studied expressed willingness to actively participate in climate action. Similarly, Mustapha et al. (2022) reported that Nigerian undergraduates demonstrated high knowledge levels of climate change which also influenced their beliefs on socio-emotional well-being. Although these studies examined knowledge and interest/willingness in climate action, they did not establish relationships between knowledge, interest and participation of their respondents in climate change mitigation activities. Despite the global emphasis on youth engagement in climate action, limited studies have examined the relationship between knowledge, interest, and engagement in Nigerian tertiary education, especially in Imo State. In view of the emergency of climate crisis, especially in Nigeria, it is paramount to study the level of knowledge, interest, and engagement in climate mitigation actions among undergraduates and determine the relationship between these indices. Hence the need for the current study.

OBJECTIVES OF THE STUDY

The study focuses on the knowledge, interest, and engagement of science education undergraduates in climate change and mitigation actions in Imo State. Specifically, this study sought to determine the following:

1. the knowledge level of Science Education undergraduates on climate change,
2. the interest level of Science Education undergraduates in climate change and climate change mitigation actions,
3. the engagement level of Science Education undergraduates in climate change mitigation actions and,
4. the relationship between knowledge, interest and engagement of Science Education undergraduates in climate change mitigation actions

The following hypothesis was formulated to guide the study:

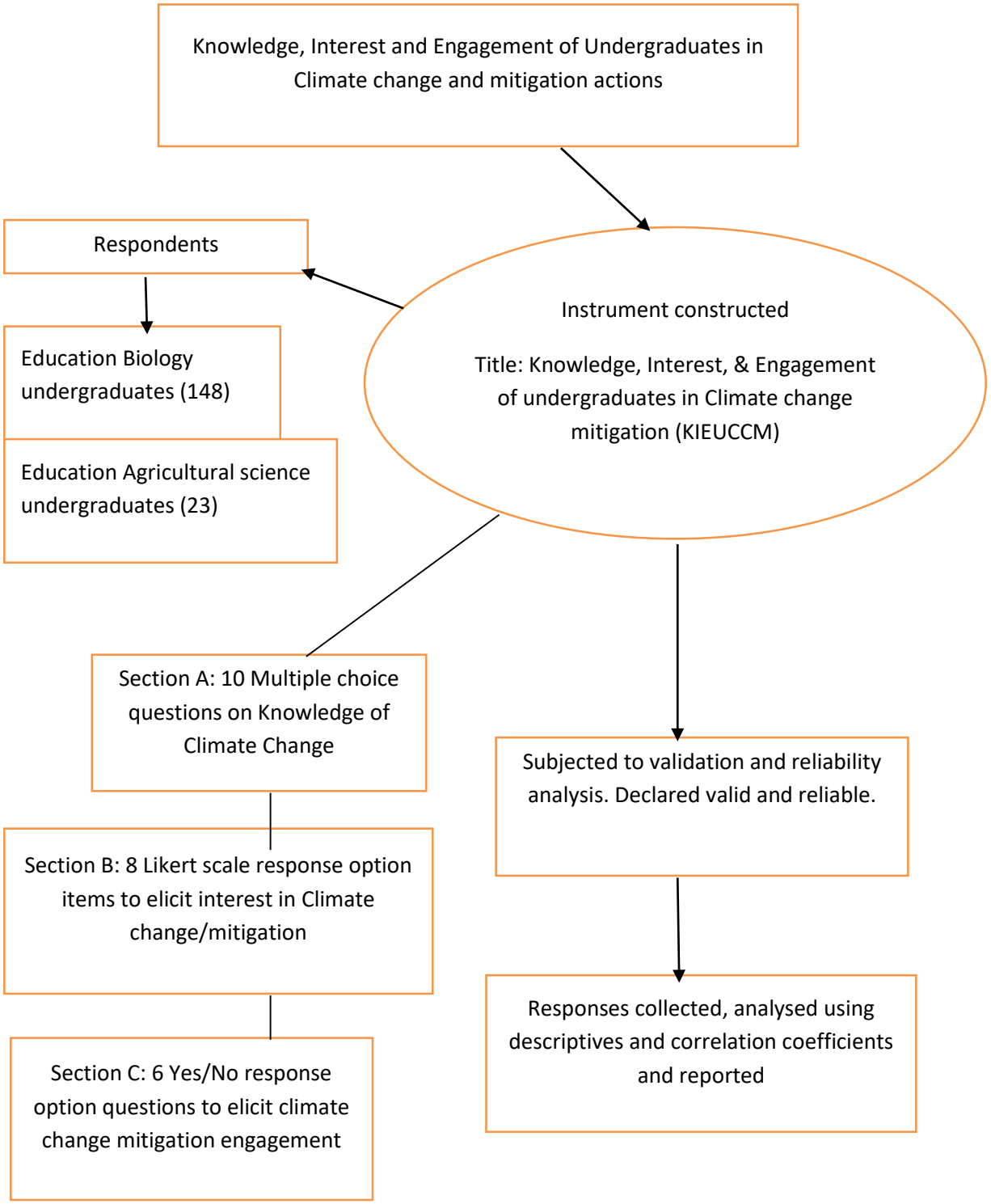
HO1: Knowledge of climate change is not significantly related to undergraduates' interest and engagement in climate change mitigation actions.

Methods

This study adopted a descriptive survey and a correlation design involving the use of rating scales for data collection. This study was specifically conducted among Science Education Undergraduates in Imo State University Owerri, Imo State, Nigeria. The choice of Imo State University stemmed from the fact that only the University to the best of the researchers' knowledge has its Science Education undergraduates exposed to climate change courses at their preliminary levels. The study population comprised 186 science education undergraduates (300 and 400 levels precisely) who were previously exposed to a climate change course in their 200-level year. The disciplines involved include Education Biology and Education Agricultural Science (the students in these disciplines have been exposed). The entire population was used as the sample size; in other words, the census sampling technique was used as the sampling technique. However, only 172 students consented to participate in the study; thus 172 undergraduates formed the final sample. For data collection, the researchers utilized an instrument titled "Knowledge, Interest and Engagement of Undergraduates in Climate Change mitigation (KIEUCCM)". The instrument is a mixture of multiple-choice option questions, a four-point Likert rating scale, and close ended questionnaire options designed by the

researchers. The instrument is sub sectioned into three: Section A_ this section is made up of 10 items in the multiple-choice format which elicited information on knowledge of climate change among the respondents (scores of 4 or less on the knowledge section were categorized as having low knowledge, scores between 5-6 were categorized as moderate knowledge while scores of 7 and above were categorized as high knowledge); Section B is made up of 8 items in four Likert point format eliciting information on the interest of undergraduates in climate mitigation activities (the Likert scale was scored thus: strongly agree=4 points, Agree = 3 points, disagree = 2 points and strongly disagree= 1 point. The cut off mean mark for the Likert scale is 2.50) and Section C has 6 close ended response format questions on students' engagement in climate change mitigation actions (a yes response option gave a score of 2 points i.e a maximum score of 12 points was obtainable for this section; respondents with scores of 4 and less were categorized as having low engagement levels, score of 6 points was categorized as moderate engagement while scores of 8points and above were categorized as high engagement). Reliability coefficients of 0.77, 0.80, and 0.79 were obtained respectively for the different sections of the instrument using Kuder Richardson 21 statistics for sections 1 and 3 and Cronbach's alpha statistics for section 2. To answer the research questions, frequencies, percentages, pie charts, mean scores, and standard deviations were used while the Pearson r statistics was used to test the hypothesis at the 0.01 level of significance.

Instrument flowchart



RESULTS AND DISCUSSIONS

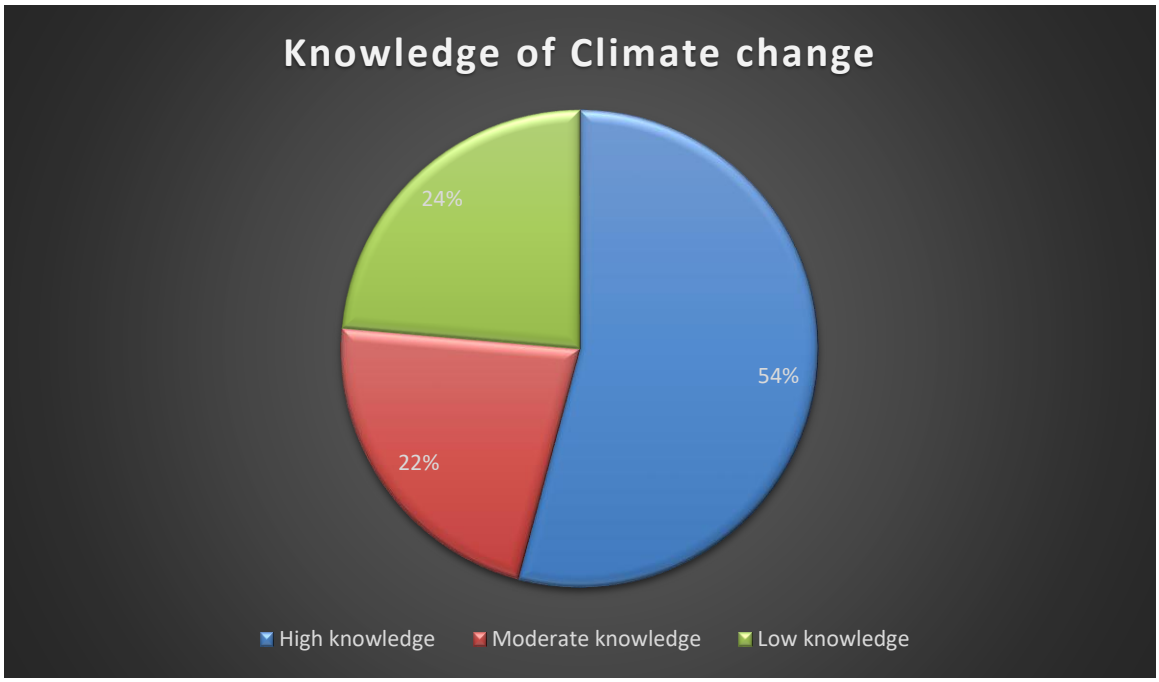


Figure 1: Knowledge level of Science Education undergraduates on climate change

Data from the multiple-choice questions on knowledge of climate change among science education undergraduates showed that 54% of the undergraduates had high knowledge of climate change. Among the respondents, 22% had moderate knowledge while 24% of the undergraduates had low knowledge of climate change. Generally, the data show that the majority of science education undergraduates, accounting for 76% of the sampled population have high to moderate knowledge of climate change. The high level of knowledge on this subject matter could be hinged on the fact that climate change awareness, powered by the government of various countries, has been on a steady increase. For example, in Nigeria, the current president, His Excellency Bola Ahmed Tinubu, has reportedly been active in the United Nations Climate Change conference. This finding is strongly backed by Wan, Hassan and Rui, (2024) who in similar study established high understanding and awareness of climate change among undergraduates in Malaysia. Wan et al.'s study further gave credence to youths in higher institutions being a vital force in improving climate across the world. These results are also in tandem with the findings of Devkota, Phuyal and Shrestha (2018) who recorded awareness of changes in temperature among 80.7% of rice farmers in Nepal. However, Mugambiwa and Dzomonda (2018) found out that University students in South Africa have low climate change knowledge.

Table 1: Interest of Science Education students on climate change and climate change mitigation

S/N	Statements	Mean	S.D	Remarks
1	Interest in news and channels discussing climate change	3.15	1.00	High
2	Highly concerned about the changing climate	3.44	0.50	High
3	Belief that individuals should change lifestyles to improve the climate	3.50	0.65	High
4	Belief that climate change is a threat which must be stopped	3.47	0.58	High
5	Belief that climate change would likely affect quality of life in 20 years' time	2.91	0.79	High
6	Feeling of a strong responsibility to mitigate climate change effects	3.21	0.63	High
7	Likelihood of supporting policies aimed at carbon emissions	3.24	0.64	High
8	Willingness to pay more for environmentally friendly products	3.27	0.61	High
	Grand mean	3.27		

On table 1 is the mean interest scores of the undergraduate respondents in climate change mitigation actions. All items in the interest rating scale had mean responses scores above 2.50 (the criterion mean). The grand mean is 3.27 which also exceeds the cut-off mean mark of 2.50. Judging by the mean scores for each interest statement, it can be deduced that the majority of the respondents have high levels of interest in climate change and climate change mitigation actions. This could generally be linked to the fact that the respondents' knowledge of climate change in research question one was high. This finding suggests a huge potential for climate engagement among undergraduates and this aligns with studies showing high levels of positive attitudes towards climate change mitigation among undergraduates (Wan, Hassan & Rui, 2024). Moreover, Leiserowitz et al. (2020) in a similar study, opined that prior and continuous information on consequences of climate change improves the willingness of youths to involve in environmental activism. The implication of this finding is that lecturers should leverage this high level of interest among undergraduates and implement strategies to involve them in climate change mitigation. This finding is supported by Jama, Diriye and Abdi (2023), who, in a similar study found that in Somalia, 77.2% of youth expressed willingness to join campaigns inclined towards afforestation for climate protection. In line with the study's results are those of Aliyu (2023), who similarly, recorded that a significant majority of undergraduate students accounting for 82% in a polytechnic in Bauchi State Nigeria, expressed interest in issues bordering the climate and willingness to participate in voluntary climate change awareness campaigns.

Table 2: Extent of Lifestyle behaviour change among Science Education undergraduates to mitigate climate change

S/N	Items	Options	Frequency	Percentage
	Personal actions			
1	Made lifestyle changes like walking instead of automobile transportation etcetera.	Yes	146	84.90
		No	26	15.10
2	Consideration of environmental impact in choice of goods	Yes	160	93.00
		No	12	7.00
3	Water conservation	Yes	158	91.80
		No	14	8.20
4	Planting trees and flowers around the environment	Yes	137	79.70
		No	35	20.30
5	Recycling waste products	Yes	122	70.90
		No	50	29.10
	Digital engagement			
6	Participation in online initiatives related to controlling climate change	Yes	33	19.20
		No	139	80.80

Table 2 shows the responses of the undergraduates on the extent of lifestyle behaviour changes (personal actions and digital engagement) in simple climate change mitigation actions. From the data, it can be deduced that the majority of the students participate in personal actions that help to mitigate climate change effects such as changing their lifestyle (84.90%), considering environmental impacts in the choice of goods (93.00%), water conservation (91.80%), planting of trees and flowers (79.70%), and waste recycling (70.90%). However, the participation of undergraduates in online and offline initiatives related to controlling climate change is low (19.20%). This shows that although engagement levels regarding personal actions to mitigate climate change may be high among the respondents, their engagement in online climate change and climate change mitigation awareness is quite low. This low level of online/digital engagement may be linked to low levels of digital literacy among undergraduates. Some undergraduates may not have the necessary skills to use online platforms for climate change awareness. Low levels of digital literacy can limit undergraduates in terms of information access, active involvement in online movements, and recognition of misinformation. Another reason for the low level of digital participation could be

gaps in the university curriculum, that is, a situation where climate change is not properly integrated into school curricula. Poor integration of climate change in the curricula limits students' exposure to structured climate change learning and the essence of utilizing digital tools to spread awareness of climate change's strong effects. In summary, when climate change is poorly integrated into the curriculum, it leads to low digital literacy and worsens students' digital engagement in climate change mitigation actions.

This implies that university administrations should properly integrate climate change into the university curricula at various levels and the use of digital tools in the spread of climate change awareness should be emphasized by lecturers through their courses. The low digital engagement in climate mitigation activities as observed in the findings, echoes the findings by Arlt et al. (2018), who in their study on climate participation, observed that few of their study's respondents were active participants in climate discourse online even though many expressed concerns for the changing climate. They further reiterated that prior interest and perceived relevance were major drivers for climate change social media engagement among individuals. Similarly, Obracht-Prondzynska et al. (2023) are of the view that the youth are not always incorporated in designing the many digital tools available for climate engagement and this limits online participation in climate actions. Their study presented the concept of a "Greencoin" digital currency as a form of incentive to promote positive climate engagement.

In line with the study's findings, Pickering, Schoen and Botta (2021) recorded that 79.8% and 53.8% of Canadian youths were actively recycling waste and conserving energy at home. However, discountenancing the findings of the study on lifestyle changes, Andersson, Timmon and Lunn (2022) in a similar study reported that only 30% of the youth studied were willing to make lifestyle changes which involved less use of cars and airplanes. This shows that actions mitigating climate change may be peculiar to undergraduates in various parts of the world.

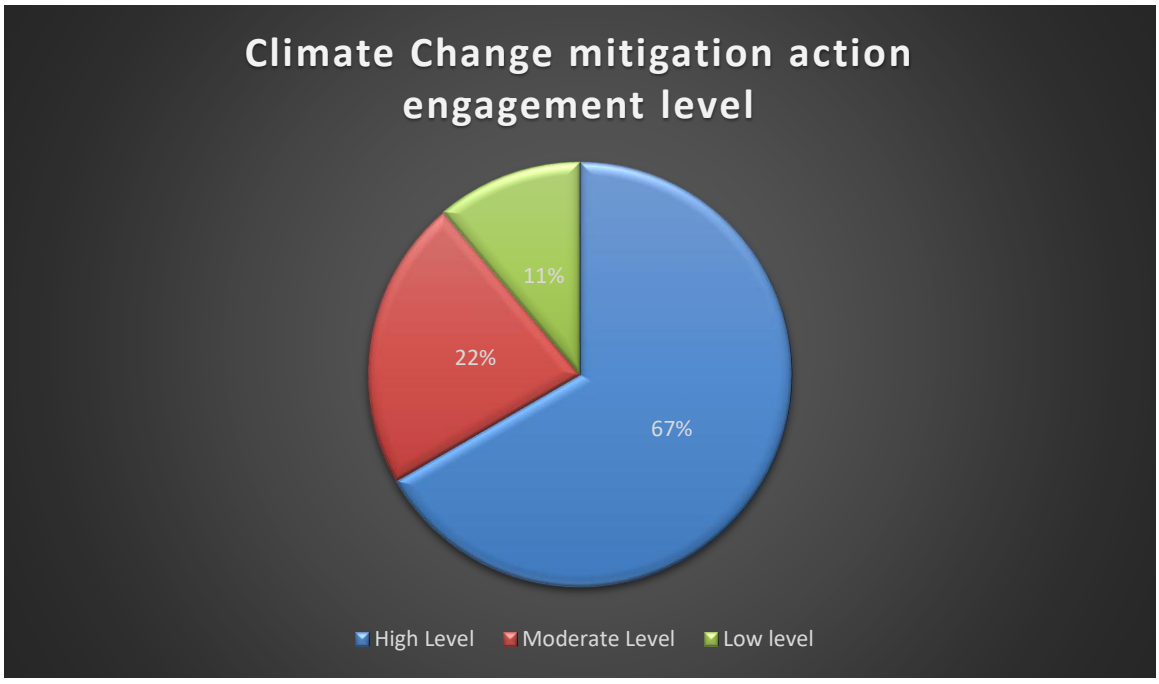


Figure 2: Summary table for extent of science education undergraduates' engagement in climate change mitigation actions

A summary of the undergraduates' engagement levels in climate change mitigation actions is shown in figure 2. This data is a summary of undergraduates' personal actions and digital engagement in climate change mitigation. The data show that 67% of the respondents engage in climate change mitigation actions to a high extent, 22% of the

undergraduates have moderate engagement levels in climate change mitigation actions while 11% of the respondents have low engagement levels in climate change mitigation actions. Generally, the findings imply that Science Education undergraduates engage in climate change mitigation action to a high extent. This high level of climate engagement suggests that these undergraduates are positively converting their knowledge of climate change as exposed to them in their previous courses on climate change into obvious behavioural change. Moreover, Molthan-Hill et al. (2022) are of the view that when students are armed with the appropriate knowledge about the climate, they become strong climate advocates in their local communities.

This is in tandem with the report given by the United Nations (2020) on youth participation in climate change mitigation actions. The UN (2020) reported that youth have become strong movers in climate action, particularly in regions such as Africa, where youth-led initiatives are making significant contributions.
Similarly, Shaikh Khatibi et al. (2021) in a systematic review, linked climate change engagement to climate awareness. They further noted that visible climate change mitigation efforts are likely to be more evident among informed communities.

Table 3: Correlation table of the relationship between knowledge, interest, and engagement of science education undergraduates on climate change mitigation actions.

Correlations

		Knowledge	Interest	Engagement
Knowledge	Pearson Correlation	1	.750**	.117
	Sig. (2-tailed)		.000	.333
	N	172	172	172
Interest	Pearson Correlation	.750**	1	.323**
	Sig. (2-tailed)	.000		.006
	N	172	172	172
Engagement	Pearson Correlation	.117	.323**	1
	Sig. (2-tailed)	.333	.006	
	N	172	172	172

**. Correlation is significant at the 0.01 level (2-tailed).

Table 3 shows the relationship among climate change knowledge, interest, and climate change mitigation engagement levels among the undergraduates featured in the study. The table shows that high and significant relationships exist between knowledge of climate change and interest in climate change and climate change mitigation actions ($r= 0.750$, $p<.05$), implying that a rise in knowledge of climate change leads to a rise in interest and vice versa; and interest in climate change/mitigation actions and engagement in climate change actions ($r=0.323$, $p<.05$), implying that an increase in climate interest invariably leads to an increase in climate change mitigation engagement among the undergraduates. This aligns with Cornejo et al. (2024), who in their study, found that strong perceptions of environmental responsibility and interest were higher among students with increased levels of climate knowledge ($r=0.12$, $p=0.02$). They further reiterated the need for concise climate education to improve affective responses to climate action.

However, the relationship between knowledge of climate and engagement in climate change mitigation activities was weak and non-significant. This implies that simply having knowledge of climate change is not necessarily enough to spur visible actions regarding mitigation activities. This is in line with the findings of Andersson, Timmon and Lunn (2022) who found out in their study that although awareness and interest in climate change was high among their respondents, it did not resonate in participation in high impact mitigation behaviours. Also, Rabbi (2025) in a similar study, reported that while high climate knowledge exists among undergraduates, their knowledge of the climate weakly correlated with proactive climate practices.

The low relationship between knowledge and engagement in climate mitigation activities can be attributed to undergraduates' motivation level. Understanding climate change is an essential initial step to encourage involvement, but students' willingness to take proactive measures to reduce its impact might be shaped by how relevant they perceive climate change to be and their emotional connection to the topic. Some students may be motivated to participate in climate action if there are incentives, such as financial benefits. Furthermore, Climate change is most times seen as an abstract topic having impacts which students may not feel are urgent. Many students do not experience severe weather changes and environmental ruin, which reduces their drive to participate in mitigation actions. In other words, the lack of immediate consequences can account for the reason behind the low and non-significant association between knowledge and participation in climate change mitigation actions. Similarly, Hügel and Davies (2020) underline the evident knowledge-action gap, recording that unless individuals feel positively motivated by their environment, they may not transcribe their knowledge of climate change into sustainable climate actions. This shows that without motivation and immediate consequences, knowledge of climate change may only remain theoretical.

CONCLUSION AND RECOMMENDATIONS

This study addressed the problem of determining the knowledge, interest, and engagement of undergraduates in climate change mitigation actions. The study's results indicate that although climate change knowledge, interest, and engagement levels were high among the respondents, knowledge of climate change did not significantly predict undergraduates' engagement in climate mitigation actions. These findings have strong implications. They underscore the importance of inclusive climate change awareness among undergraduates for adoption of operative mitigation plans. The findings of this study suggest that universities must propose and design compulsory courses incorporating the active use of social media tools and technologies, which will arm undergraduates with the ability to become change drivers when faced with the problems created by climate change. In conclusion, climate change is a global concern calling for intervention in diverse perspectives. Active and hands-on responses characterized by making simple lifestyle changes, and taking part in creating awareness through utilisation of social media handles on the part of undergraduates will go a long way in deterring the adverse impacts of climate change globally.
Based on the findings, the researchers recommend that lecturers teaching undergraduate climate change courses in universities, encourage their students to engage in online climate change awareness in order to help spread awareness. Departments should create campus-based climate awareness clubs and run digital campaigns to improve undergraduate engagement in climate action. Universities should incorporate climate change topics into various courses, making environmental knowledge a fundamental part of students' academic experience.

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REFERENCES

Alfred, R., & Sivarajah, N. (2021). Exploring strategies for climate action: An active engagement by active citizens. *International Journal of Applied Chemical and Biological Sciences*, *2*(4), 125–132. https://visnav.in/ijacbs/wp-content/uploads/sites/3/2021/08/Exploring-strategies-for-climate-action-An-active-engagement-by-Active-Citizens.pdf

Aliyu, F. (2023). Assessment of willingness to participate in climate change activism among ATAP students, Bauchi State, Nigeria. *African Journal of Humanities and Contemporary Education Research*, 10(1),276-286. https://publications.afropolitanjournals.com/index.php/ajhcer/article/view/399

Andersson, Y., Timmons, S., & Lunn, P. (2022). Youth knowledge and perceptions of climate mitigation. *Research Series, The Economic and Social Research Institute (ESRI), Dublin*, 153. https://doi.org/10.26504/rs153

Arlt, D., Hoppe, I., Schmitt, J.B., De Silva-Schmidt, F., & Brüggemann, M. (2018). Climate engagement in a digital age: Exploring the drivers of participation in climate discourse online in the context of COP21. *Environmental Communication*, 12(1), 84-98. https://doi.org/10.1080/17524032.2017.1394892

Ayanlade, A. & Jegede, M.O. (2016). Climate change education and knowledge among Nigerian university graduates. *Weather, Climate, and Society*, 8(4), 465–473. https://doi.org/10.1175/WCAS-D-15-0071.1

Birolo, A. & Carvalho, O. de O. (2024). Public engagement in climate change mitigation actions. *Desarrollo Local Sostenible*, 17(62), e3205. https://doi.org/10.55905/rdelosv17.n62-113

Carrillo-Nieves, D., Clarke-Crespo, E., Cervantes-Avilés, P., Cuevas-Cancino, M., & Vanoye-García, A. Y. (2024). Designing learning experiences on climate change for undergraduate students of different majors. *Frontiers in Education*, 9(4), 1284593. https://doi.org/10.3389/feduc.2024.1284593

Clarke-Crespo, E., Carrillo Nieves, D., Cervantes-Avilés, P., Cuevas-Cancino, M., & Vanoye-Garcia, A. Y. (2021). Learning process of causes, consequences and solutions to climate change of undergraduate students without background in the subject. *Global Engineering Education Conference*, 1035-1039. https://doi.org/10.1109/EDUCON46332.2021.9454046

Cornejo, G. A., Lamiño, P., & Trejos, B. (2024). Climate Change: Relationship between Knowledge andPerception in Students of an Agricultural-Based University in Ecuador. *Sustainability*, 16(13), 5548. https://doi.org/10.3390/su16135548

Deshiana, A., Sriyanti, I., & Ismet, I. (2022). High school students' awareness and attitudes toward climate change. *Berkala Ilmiah Pendidikan Fisika*, 10 (3), 255-239. 10.20527/bipf.v10i3.14001

Devkota, N., Phuyal, R. K., & Shrestha, D. L. (2017). Perception, determinants and barriers for the adoption of climate change adaptation options among Nepalese rice farmers. *Agricultural Sciences*, 9, 272-298. https://doi.org/10.4236/as.2018.93021

Hügel, S., & Davies, A.R. (2020). Public participation, engagement, and climate change adaptation: A review of the research literature. *WIREs Clim Change*, 11, e645. https://doi.org/10.1002/wcc.645

Islam, M. T., & Lelin, P. (2023). Tweeting climate strike: A netnographic study of Fridays for future's narratives in the USA and Bangladesh. *Indian Journal of Mass Communication and Journalism (IJMCJ)*. https://doi.org/10.54105/ijmcj.b1058.123223

Jama, O. M., Diriye, A. W., & Abdi, A. M. (2023). Understanding young people's perception toward forestation as a strategy to mitigate climate change in a post-conflict developing country. *Environment, Development and sustainability*, *25*(6), 4787-4811. 10.1007/s10668-022-02242-5

Khatibi, F.S., Dedekorkut-Howes, A., Howes, M., & Torabi, E.(2021). Can public awareness, knowledge and engagement improve climate change adaptation policies? *Discover Sustainability*, 2(18). https://doi.org/10.1007/s43621-021-00024-z

Leiserowitz, A., Maibach, E., Rosenthal, S., Kotcher, J., Bergquist, P., Ballew, M., Goldberg, M., Gustafson, A., & Wang, X. (2020). *Climate Change in the American Mind: April 2020*. Yale University and George Mason University. New Haven, CT: Yale Program on Climate Change Communication. Climate Change in the American Mind: April 2020 - Yale Program on Climate ChangeCommunication

Molthan-Hill, P., Blaj-Ward, L., Mbah, M.F., & Ledley, T.S. (2022). Climate change education atuniversities: Relevance and strategies for every discipline. In: Lackner, M., Sajjadi, B., Chen, WY. (eds) Handbook of climate change mitigation and adaptation. Springer, Cham. https://doi.org/10.1007/978-3-030-72579-2_153

Mugambiwa, S. S., & Dzomonda, O. (2018). Climate change and vulnerability discourse by students at a South African university. *Journal of Disaster Risk Studies*, 10(1), 1-6. https://doi.org/10.4102/jamba.v10i1.476

Mustapha, M.L.A., Muhammed, S.A., & Yusuf, J. (2022). Impact of climate change awareness on undergraduates' socio-emotional wellbeing in Nigeria. *International Journal of Emotional Education*, 14(2), 53-57. 10.56300/GDUE5169

Newton, H., & Romkey, L. (2024). *Examining climate anxiety and sustainability engagement in the undergraduate engineering student population.* Paper presented at 2024 ASEE Annual Conference & Exposition, Portland, Oregon. https://doi.org/10.18260/1-2--47369

Obracht-Prondzyńska, H., Radziszewski, K., Anacka, H., Duda, E., Walnik, M., Wereszko, K., & Geirbo, H.C. (2023). Codesigned Digital Tools for Social Engagement in Climate Change Mitigation. *Sustainability*, *15*(24), 16760. https://doi.org/10.3390/su152416760

Okafor, C. C., Ajaero, C. C., Madu, C. N., Nzekwe, C. A., Otunomo, F. A., & Nixon, N. N. (2024). Climate change mitigation and adaptation in Nigeria: A Review. *Sustainability*, *16*(16), 7048. https://doi.org/10.3390/su16167048

Pickering, G. J., Schoen, K., & Botta, M. (2021). Lifestyle decisions and climate mitigation: current action and behavioural intent of youth. *Mitigation and Adaptation Strategies for Global Change*, *26*, 1-27. 10.1007/s11027-021-09963-4

Rabbi, R. H. (2025). Knowledge, awareness, and practices regarding climate change among undergraduate students. In Review. https://doi.org/10.21203/rs.3.rs-5932162/v1

United Nations (2020). Increasing youth participation in climate action. United Nations. https://www.un.org/en/increasing-youth-participation-climate-action

Wan, J., Hassan, M. S., & Rui, S. (2024). Relationship between background of youth and their awareness, attitude and perception towards climate change. *PaperASIA*, *40*(4b), 114-131. https://doi.org/10.59953/paperasia.v40i4b.155

Wielk, E., & Standlee, A. (2021). Fighting for their future: An exploratory study of online community building in the youth climate change movement. *Qualitative Sociology Review*, *17*(2), 22–37. https://doi.org/10.18778/1733-8077.17.2.02