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Climate Change Engagement: Youth Perspectives and Pathways to Climate Action

Myla M. Arcinas[1]*, Erwin Apostol[2], Sofronio G. Lingatong, Jr.[3], Myla M. Sulat[4], Maria Carla A. Jayme[5],
[1]https://orcid.org/0000-0002-5795-031X De La Salle University
myla.arcinas@dlsu.edu.ph
[2]https://orcid.org/0009-0004-3611-9123 De La Salle University
erwin_apostol@dlsu.edu.ph
[3]https://orcid.org/0009-0005-1429-987X De La Salle University
sofronio.lingatong@dlsu.edu.ph
[4]https://orcid.org/0009-0003-7025-5586 De La Salle University
mylene.sulat@dlsu.edu.ph
[5]https://orcid.org/0009-0008-9161-4054
De La Salle University
maria.carla.jayme@dlsu.edu.ph
Corresponding Author* Myla M. Arcinas*
myla.arcinas@dlsu.edu.ph

Abstract
This mixed-methods study investigates the factors influencing climate change engagement among secondary school students (N = 45). The research examines the interplay of awareness, perception, beliefs, willingness, and intention by integrating quantitative surveys and qualitative focus group discussions. Quantitative findings reveal that while willingness, beliefs, and perception significantly correlate with intention ($p < .001$), awareness does not. Qualitative data elucidate the diverse sources of climate change information for students and their nuanced understanding of climate change impacts. The study concludes that interventions should prioritize fostering willingness, beliefs, and perceptions to enhance youth engagement in climate action, moving beyond a sole focus on awareness.
Keywords: Youth engagement, Climate change, Awareness, Perception, Belief, Willingness, Intention

INTRODUCTION

Climate change is one of our time's most urgent and complex challenges, necessitating a concerted global effort to foster environmental sustainability (IPCC, 2024). Within this context, youth engagement has emerged as a pivotal factor, with young people's capacity to drive meaningful change being increasingly recognized. While youth awareness of climate change is growing, translating this awareness into consistent and effective action remains poorly understood.

Research indicates that youth environmental engagement is a multifaceted phenomenon, encompassing knowledge, perceptions, beliefs, and the ability to act (Thompson et al., 2023; Rodriguez & Chen, 2024). However, a significant gap exists in the literature regarding the interplay of these factors, particularly concerning how awareness influences action among secondary school students.

Previous studies have often examined isolated aspects of environmental engagement, such as knowledge

levels (Williams & Park, 2023) or specific environmental behaviors (Anderson et al., 2024). These single-method approaches fail to capture the complex dynamics between awareness, beliefs, and action. Furthermore, while quantitative studies have correlated environmental knowledge with behavioral intentions (Lee et al., 2023), they frequently neglect the contextual nuances and obstacles that shape actual engagement. This has led to a limited understanding of the comprehensive nature of youth climate change engagement.

The present study employed a mixed-methods approach to investigate climate change engagement among secondary school students to address these limitations. By integrating quantitative measures of awareness, perception, beliefs, willingness, and intention with qualitative explorations of students' experiences and perspectives, this research aims to provide a more holistic understanding of youth engagement with climate change and the factors influencing their capacity for environmental action.

The following research objectives guided the research:

1. To determine if a significant difference exists in students' climate change engagement (awareness, perception, and action intention) before and after an intervention.
2. To examine the correlations between awareness, beliefs, willingness, perception and action intention among secondary school students regarding climate change.
3. To explore daily how students understand and engage with climate change issues.

This research contributes to the existing literature by providing a mixed-methods youth climate change engagement analysis. It offers a more nuanced and comprehensive understanding of the factors influencing young people's capacity to act on climate change.

METHOD RESEARCH

Design

This study employed a parallel mixed-methods design, integrating quantitative surveys with qualitative focus group discussions. This approach allowed for concurrently collecting and analyzing numerical data to measure youth climate change engagement patterns and in-depth qualitative data to explore the contextual factors influencing that engagement. Integrating these methods facilitated a more comprehensive and nuanced understanding of the research problem than either method alone could provide.

Participants

Participants included 45 high school students aged 16-20 (M = 17.4, SD = 1.2). The students were recruited from an urban public secondary school. The sample comprised 72.0% female (n = 32), 21.3% male (n = 10), and 6.7% non-binary (n = 3) students. Participants were selected using purposive sampling to ensure representation across grade levels. All participants were enrolled in regular academic programs and participated in the study's quantitative and qualitative components.

Intervention

The intervention included an environmental education program integrated into the students' social studies curriculum. The program focused on a different climate change theme: (1) understanding climate change, (2) impacts on local and global ecosystems, (3) mitigation and adaptation strategies, and (4) individual and collective action. The program incorporated various teaching methods, including storytelling, photovoice technique, discussions, multimedia presentations, and mural making as hands-on activities for the action. Students also designed and implemented mural making as a small-scale environmental action.

Figure 1
Photovoice Output of the Students

Instruments and Measures

Quantitative data were collected using the Climate Change Engagement Scale (CCES), adapted from Johnson and Smith's (2023) environmental engagement inventory. The CCES measures five dimensions of youth climate change engagement:

- Awareness (6 items, $\alpha = .85$): Students' knowledge and understanding of climate change issues.
- Perception (5 items, $\alpha = .82$): Students' views and attitudes towards climate change.
- Beliefs (7 items, $\alpha = .88$): Students' convictions about the causes, consequences, and solutions to climate change.
- Intention (6 items, $\alpha = .83$): Students' willingness to take action to address climate change.
- Willingness (5 items, $\alpha = .86$): Students' readiness to engage in pro-environmental behaviors.

All items were measured using a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). The scale was adapted by rewording some items to ensure clarity and cultural appropriateness for the study's specific context. This process included consultation with experts in environmental education and a pilot test with a separate sample (n = 20) of students with characteristics similar to those of the study participants. The pilot test results indicated that the CCES was clear, understandable, and culturally relevant for the target population.

Qualitative data were collected through semi-structured focus group discussions. A focus group protocol was developed based on a review of the literature and expert consultation. The protocol explored five key areas:

- Sources of climate change knowledge
- Understanding of environmental issues
- Personal experiences with climate change
- Barriers and enablers to environmental action
- Current and planned environmental initiatives

This approach allowed for in-depth exploration of participants' experiences and perspectives while maintaining consistency across discussion groups.

PROCEDURES

Participants were recruited through school administrators, and informed consent was obtained from all participants and their guardians before data collection began. Quantitative data collection occurred through the administration of the CCES to participants in a classroom setting. Participants completed the

survey at two time points: before and after the four-week intervention. Qualitative data were collected through focus group discussions, with each group comprising 6-8 participants. Trained researchers facilitated discussions and audio-recorded them to ensure accurate transcription.

DATA ANALYSIS

Analysis followed a parallel mixed methods framework, integrating quantitative and qualitative findings to provide comprehensive insights into youth climate change engagement. Quantitative analysis included descriptive statistics (means and standard deviations) to summarize participant responses. Paired samples t-tests were used to compare pre- and post-test scores on the CCES dimensions. Pearson correlation coefficients (r) were calculated to examine the relationships between intention and the other engagement variables. Reliability analysis was conducted to confirm the internal consistency of the CCES scales. Statistical significance was set at $p < .05$.

RESULTS

Quantitative Findings

Student Engagement Measures, Pre-Post Test Comparisons Table 1
Pre-Post Test Comparisons for Student Engagement Measures (N = 45)

Variable	Pre-test *M* (*SD*)	Post-test *M* (*SD*)	Mean Difference	*p*-value	Statistical Interpretation
Awareness	3.35 (0.50)	3.32 (0.60)	-0.03	.366	Non-significant decrease; slightly increased variability post-intervention
Perception	3.34 (0.43)	3.37 (0.57)	0.03	.357	Non-significant increase; more varied perceptions post-intervention
Beliefs	3.82 (0.27)	3.84 (0.29)	0.02	.318	Non-significant improvement; remained the most stable dimension.
Willingness	3.53 (0.43)	3.63 (0.40)	0.10	.060	Marginally significant increase ($p < .10$); most responsive to intervention
Action Intention	3.51 (0.41)	3.50 (0.48)	-0.01	.431	Non-significant decrease; slightly increased variability in responses

Note. All variables were measured on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Paired samples *t*-tests were used to compare pre- and post-test means. Statistical significance was set at $p < .05$.

Pre-post comparisons of student engagement measures ($N = 45$) revealed no statistically significant changes across the five dimensions measured at the conventional $p < .05$ level. The Willingness dimension approached statistical significance with the largest mean increase ($\Delta M = 0.10$, $p = .060$), suggesting a marginally significant trend toward improved willingness to engage following the intervention. For the remaining dimensions, changes were minimal and non- significant: Perception ($\Delta M = 0.03$, $p = .357$), Beliefs ($\Delta M = 0.02$, $p = .318$), Awareness ($\Delta M = -0.03$, $p = .366$), and Intention ($\Delta M = -0.01$, $p = .431$).

Examination of standard deviations indicated increased response variability in post-test measures for Awareness, Perception, Beliefs, and Intention, while Willingness showed slightly decreased variability (pre-test *SD* = 0.43, post-test *SD* = 0.40). This pattern suggests that while mean scores remained relatively stable, individual responses became more diverse following the intervention for most dimensions.

These findings have several implications for educational practice and future research. First, the marginally significant improvement in Willingness ($p = .060$) warrants further investigation, as it may indicate that the intervention was most effective at enhancing students' willingness to engage rather than changing their awareness, perceptions, beliefs, or intentions. The lack of significant changes in other dimensions suggests that the intervention may have been too brief or insufficiently targeted to produce measurable changes in these aspects of student engagement.

Associations Between Key Social Engagement Variables and Action Intention

Correlation analyses examined relationships between students' intention to engage and other key engagement variables. Results revealed statistically significant, positive correlations between Intention and three variables: Willingness ($r = .527$, $p < .001$), Beliefs ($r = .488$, $p < .001$), and Perception ($r = .436$, $p < .001$). These moderate-to-strong correlations suggest that students who reported higher willingness to engage, stronger engagement-related beliefs, and more positive perceptions also reported stronger intentions to engage. In contrast, Awareness demonstrated only a weak, non-significant correlation with Intention ($r = .110$, $p = .173$), indicating that students' awareness of engagement opportunities was not significantly associated with their intention to engage.

Table 2

Correlations Between Key Social Engagement Variables and Action Intention

Variable	*r* with Intention	*p*-value	Statistical Interpretation
Awareness	.110	.173	Weak, non-significant positive correlation; awareness and intention are minimally related
Perception	.436***	< .001	Moderate, significant positive correlation; improved perception is associated with stronger intention
Beliefs	.488***	< .001	Moderate, significant positive correlation; stronger beliefs relate to higher intention to engage
Willingness	.527***	< .001	Strong, significant positive correlation; highest association with intention among all variables

Note. Pearson correlation coefficients (*r*) were calculated to examine relationships between intention and other engagement variables. Asterisks denote statistical significance: *** $p < .001$.

The correlation strength hierarchy provides valuable insights into factors that may influence students' intentions most strongly. Willingness demonstrated the strongest correlation with Intention (r = .527), followed closely by Beliefs (r = .488) and then Perception (r = .436). The substantial difference between these correlations and that of Awareness (r = .110) suggests that while awareness of engagement opportunities is important, it alone may not significantly drive intention. Rather, students' willingness to engage, their beliefs about engagement, and their perception of engagement opportunities appear more strongly linked to their behavioral intentions.

These findings have important implications for educational practice and theory. Educators should prioritize strategies addressing willingness, beliefs, and perceptions when designing interventions to enhance student engagement rather than merely increasing awareness. The strong correlation between willingness and intention suggests that helping students overcome barriers to engagement and fostering intrinsic motivation may be particularly effective.
Similarly, the significant correlations with beliefs and perceptions indicate that cultivating positive attitudes toward engagement and ensuring students perceive engagement opportunities as valuable may substantially influence their intentions.

Qualitative Findings
Table 3 encapsulates the thematic analysis of focus group discussions, structured around three principal themes that emerged as central to understanding youth engagement with climate change: Information Sources, Climate Change Understanding, and Perceived Impact and Action Initiatives.

Table 3: Qualitative Findings from the Focus Group Discussion

Theme Category	Sub-Theme	Detailed FGD Results	Illustrative Quotes
Information Sources			
	Traditional Media	Students still rely on traditional media for information. Television and radio are cited as sources for news and weather updates.	"I still watch the news on television and listen to the radio" (P6)
	Formal Education	School-based learning plays a role in raising awareness. Teachers discuss environmental change issues in class.	"Our teacher tackles issues related to environmental change." (P4)
	Informal Education	Family discussions contribute to students' environmental awareness. Parents teach the	"My parents teach us to be concerned with protecting trees and the environment." (P4)

		importance of conservation.	
	Digital Media Transition	A shift from traditional to digital platforms is evident, especially for weather forecasts.	"I always follow the news regarding weather forecasts." (P6)
		YouTube is a popular source for information.	"I used to follow this issue by watching television, but nowadays, I have already shifted to watching YouTube" (P2)
			"My friends and I follow related issues using YouTube" (P3)
	Online Engagement	Students actively use online platforms to seek environmental information and engage with communities. This includes browsing environmental platforms and joining online groups.	"I love to browse various online platforms that are showing concern on environmental issues and innovative approaches to help address related issues." (P4)
			"I support and join online groups that address environmental change issues and problems" (P1)
Climate Change Understanding			
	Observed Weather Changes	Students recognize basic weather pattern changes, noting hotter summers and more intense rainy seasons with increased flooding.	"It is getting hotter during the summer, and floods worsen during the rainy season." (P7)
	Extreme Temperatures	Participants report experiencing extreme heat, with temperatures reaching high levels.	"During the Summer, the heat is too much; it is hot, and the temperature goes as high as 40 degrees or higher." (P3)
	Weather Instability	Students perceive increased unpredictability in weather patterns, with rapid shifts between hot and rainy conditions.	"The weather at times can be unpredictable; it is too hot, then suddenly, it rains." (P1)
	Global Awareness	Some students express awareness of the global	"Advanced-industrialized countries abused the

		dimension of climate change, particularly the disparity in impact between industrialized and poor countries.	environment; the poor countries suffer more." (P5)
Perceived Impact and Action Initiatives			
	Local Environmental Effects	Participants describe the impact of climate change on their local communities, including increased flooding, disruptions to classes due to extreme heat, and work cancellations.	"During the rainy season, many families in our barangay experienced heavier flooding than before." (P1) "Many classes shifted to online meetings due to the extreme heat." (P7) "During the rainy season, many cancellations of work due to flooding in many areas" (P8)
	Broader Consequences	Students are aware of the broader consequences of climate change, such as impacts on food production and security.	"The extreme floods in the northern part of the countries affected food production, harvest and food security" (P6)
	Call for Government Action	There is an expressed need for government intervention to address the long-term effects of climate change and disasters.	"The country is experiencing many disasters affecting many people's lives. The government should consider appropriate actions to address the long-term effects of disasters on its people." (P2)
	Individual Responsibility	Students acknowledge the importance of individual actions in addressing environmental problems, such as water conservation	"Even in small acts, individual constituents should help address environmental issues, water conservation and

		and waste segregation.	waste segregation." (P7)
	Emphasis on Food Security Solutions	Participants suggest local solutions to food security challenges, such as urban gardening.	"Urban gardening will help a lot to address food scarcity." (P8)

Table 3 presents a synthesized view of the qualitative data from focus group discussions, organized around three central themes: Information Sources, Climate Change Understanding, and Perceived Impact and Action Initiatives.

Information Sources: The data highlight students' diverse sources of information about climate change.

Traditional media, including television and radio, remain relevant in providing news and weather updates.

Formal education settings, such as school-based learning, contribute by addressing climate change issues within the curriculum.

Informal education occurs through family discussions, where parents foster environmental awareness and promote conservation.

There is a notable transition towards digital media, with platforms like YouTube becoming increasingly important for accessing information, particularly weather forecasts.

Students also actively engage with online platforms for environmental information and participate in online environmental communities.

Climate Change Understanding: Students demonstrate an understanding of climate change through various observations and awareness:

They recognize changes in basic weather patterns, such as hotter summers and increased flooding during rainy seasons.

They perceive extreme temperatures, with reports of very high heat levels.

They note the unpredictability of weather, characterized by rapid shifts between hot and rainy conditions.

Some students express awareness of the global dimensions of climate change, particularly the unequal impact on industrialized versus poorer countries.

Perceived Impact and Action Initiatives: Students perceive climate change as having a significant impacts and identify various action initiatives:
They describe local environmental effects, including increased flooding and disruptions to daily life, such as school closures and work cancellations.

They know broader consequences, such as food production and security impacts.

They express a need for government action to address the long-term effects of climate change and related disasters.

They also emphasize the importance of individual responsibility in addressing environmental problems through actions like water conservation and waste segregation.

Some students suggest local solutions to food security challenges, such as urban gardening.

Implications for Research

Multi-faceted Approach to Education: The reliance on diverse information sources underscores the need for a multi-faceted approach to climate change education. Educators should leverage both traditional and digital media, integrate discussions into school curricula, and engage families in promoting environmental awareness.

Relevance of Local Impacts: Students' emphasis on local environmental effects highlights the importance of making climate change education relevant to their daily lives. Connecting global climate change to local consequences can enhance student engagement and motivation to act.

Empowerment and Agency: The discussion of both individual and governmental action initiatives suggests that students recognize the importance of empowerment and agency. Educational strategies should foster a sense of agency by providing students with opportunities to take meaningful action at both individual and community levels.

Addressing Food Security: Concern over food security and suggestions of solutions like urban gardening indicate that climate change education can be linked to practical, community-based initiatives. This connection can help students see the direct relevance of climate action to their lives and communities.

Global Awareness: Recognizing the global dimensions of climate change, particularly the disparity in impacts, implies that education should also foster a sense of global citizenship and an understanding of climate justice.

Table 3 provides valuable qualitative insights into how students perceive, understand, and engage with climate change. These findings can inform the development of more effective educational strategies and interventions to promote youth climate change engagement.

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Integrated Mixed-Methods Findings

Table 4 presents an integrated analysis of the quantitative and qualitative findings, providing a synthesized interpretation of the study's results. This integration, juxtaposing statistical outcomes with qualitative insights, allows for a more nuanced understanding of youth climate change engagement.

Table 4: Integrated Mixed-Methods Findings

Theme	Quantitative Findings	Qualitative Findings	Integrated Interpretation
Awareness	Pre-Post: Non-significant decrease; increased variability Correlation: Weak, non-significant with Intention	Information Sources: traditional/digital media, school, family, communities Quantitative: Unchanged by intervention; weakly related to intention. Qualitative: Shaped by diverse sources.	Diverse sources may dilute the intervention's impact.
Perception	Pre-Post: Non-significant increase; increased variability Correlation: Moderate, significant with Intention	Climate Change Understanding: Weather changes, extreme temperatures, unpredictability, global impact Quantitative: Linked to intention; variability increased. Qualitative: Students perceive climate change.	Intervention influenced perception, range. Perception affects intention.
Beliefs	Pre-Post: Non-significant improvement; stable Correlation: Moderate, significant with Intention	Perceived Impact & Action: Beliefs about impacts; support for action | * Quantitative: Stable; moderately related to intention. * Qualitative: Beliefs on impacts and solutions.	Stable beliefs influence intention. Interventions need a stronger belief focus.
Willingness	Pre-Post: Marginally significant increase	Action Initiatives: Individual/collective action | Quantitative: Most change; strongest link to intention.	Intervention tapped into willingness, a key intention driver.

	Correlation: Strong, significant with Intention	Qualitative: Students are ready to act.	
Intention	Pre-Post: Non-significant decrease; increased variability Correlation: Influenced by Perception, Beliefs, Willingness	Action Initiatives: Individual/governmental actions Quantitative: Unchanged; influenced by other factors. Qualitative: Intentions link to beliefs, perceptions, and willingness.	Intention is complex, shaped by willingness, beliefs, and perceptions

Awareness: The quantitative data indicate that the intervention had no significant impact on students' awareness levels, and awareness showed a weak correlation with intention to act. In contrast, the qualitative findings reveal that students acquire climate change information from various sources, including traditional and digital media, school, family, and communities. The integrated interpretation suggests that while awareness is multifaceted, as shown by the qualitative data, it may not be a strong direct driver of intention, and the intervention was ineffective in altering it.

Perception: Quantitatively, students' perceptions showed a non-significant increase post- intervention, yet a moderate, significant correlation with intention. Qualitatively, students demonstrated an understanding of climate change through recognizing weather changes, extreme temperatures, unpredictability, and global impacts. The integrated analysis indicates that the intervention might have influenced the range of students' perceptions (increased variability), while perception remains a significant predictor of their intention to engage.

Beliefs: Quantitative results showed that beliefs remained stable and were moderately correlated with intention. Qualitative findings detailed students' beliefs about the impacts of climate change and their support for action initiatives. The integrated view is that beliefs are relatively stable but play a crucial role in shaping intentions. Interventions may need to focus more on modifying belief systems to influence engagement.

Willingness: Quantitatively, willingness showed the most significant change post-intervention and strongly correlated with intention. Qualitatively, students expressed a readiness to act individually and collectively. The integrated interpretation is that the intervention effectively tapped into students' willingness, making it a key driver of their intention to engage.

Intention: Quantitatively, intention itself did not significantly change due to the intervention but was influenced by perception, beliefs, and willingness. Qualitatively, students' intentions were evident in their suggestions for individual and governmental actions. The integrated analysis

suggests that intention is a complex construct shaped by willingness, beliefs, and perceptions, rather than being directly altered by the intervention.

The integrated findings have several important implications:

Complexity of Engagement: The study confirms the complex interplay of awareness, perception, beliefs, willingness, and intention in youth climate change engagement. Interventions to enhance engagement should address these multiple dimensions rather than focusing on single factors like awareness.

Role of Willingness: Willingness appears to be a critical factor in driving intention. Educational strategies should prioritize fostering and tapping into students' willingness to engage, potentially by providing opportunities for action and addressing barriers to engagement.

Importance of Beliefs and Perceptions: Beliefs and perceptions also significantly influence intention, highlighting the need to cultivate positive beliefs and perceptions about climate change engagement.

Limitations of Interventions: The study's intervention had limited success in significantly altering most quantitative measures, suggesting that more intensive or prolonged interventions may be necessary.

Value of Mixed-Methods: The mixed-methods approach provided a richer and more comprehensive understanding of youth engagement than either quantitative or qualitative methods alone.

Overall, Table 4 effectively integrates quantitative and qualitative findings to offer a more holistic perspective on the factors influencing youth climate change engagement.

Discussion

This study employed a mixed-methods approach to comprehensively investigate the factors influencing climate change engagement among secondary school students. The findings offer nuanced insights into the interplay of awareness, perception, beliefs, willingness, and intention in shaping youth engagement with climate change.

Awareness and Intention

The quantitative results indicated that the intervention had no significant effect on students' awareness levels, and awareness demonstrated a weak correlation with intention to act. This finding is consistent with previous research that has challenged simplistic information-deficit models, suggesting that merely increasing awareness does not automatically translate into increased intention or action (Kollmuss & Agyeman, 2002; Hamilton, 2008) [Lee et al., 2023]. Qualitative data highlighted the various sources from which students acquire climate change information, including traditional and digital media, school, family, and communities. This convergence of findings underscores the complexity of awareness; while necessary, it is insufficient for driving intention, and educational interventions must go beyond simply providing information.

Perception, Beliefs, and Intention

Perception and beliefs were moderately and significantly correlated with intention, aligning with established behavior change theories. These theories emphasize the role of attitudes and beliefs as precursors to behavioral intentions (Ajzen, 1991; Fishbein & Ajzen, 1975). Students' perceptions of climate change impacts and their beliefs about the efficacy of action are critical in shaping their willingness to

engage. The qualitative data supported these quantitative findings, with students expressing concerns about local and global climate change impacts and articulating beliefs about the importance of individual and collective action. This highlights the importance of educational strategies that not only provide information but also cultivate positive perceptions and empower beliefs in students' ability to make a difference (Zimmerman, 2000).

Willingness as a Key Driver

Willingness emerged as the strongest predictor of intention, underscoring the importance of motivation and agency in youth climate change engagement. This aligns with studies that have emphasized the role of intrinsic motivation and self-efficacy in promoting pro-environmental behavior (Ryan & Deci, 2000; Bandura, 1977). The qualitative data further illustrated this, with students expressing a readiness to engage in various action initiatives. Interventions that foster a sense of agency and provide opportunities for active participation will likely be most effective in enhancing students' intentions to act.

Limitations and Implications

The study's intervention did not significantly alter most quantitative measures, indicating that interventions of longer duration or greater intensity may be required to produce measurable changes in awareness, perception, beliefs, and intention. This is consistent with calls for longitudinal studies and sustained educational efforts in environmental education research (Disinger & Roth, 1992; Hungerford & Volk, 1990). However, the mixed-methods approach proved valuable, providing a richer and more nuanced understanding of youth engagement than either method alone.

The implications of this study highlight the need for multifaceted educational approaches that address the complex interplay of factors influencing youth climate change engagement. Rather than increasing awareness, educators should foster willingness, cultivate positive beliefs and perceptions, and provide opportunities for meaningful action.

CONCLUSION

This mixed-methods study contributes significantly to the literature on youth climate change engagement by providing a holistic analysis of the interplay between key factors influencing pro- environmental action. The research design's strength lies in its integration of quantitative and qualitative data, which allowed for a more nuanced interpretation of the complex dynamics of awareness, perception, beliefs, willingness, and intention among secondary school students. Notably, the findings challenge the assumption that awareness is a primary driver of intention, demonstrating instead that willingness, beliefs, and perceptions play more critical roles in shaping young people's inclination to engage with climate change issues. This distinction has important theoretical implications, particularly for models of behavior change that often prioritize knowledge dissemination. Furthermore, the study's methodological approach is a robust example for future research exploring the multifaceted nature of environmental attitudes and behaviors.

The study's findings have practical relevance for designing more effective climate change education programs and interventions. By identifying willingness as a key driver of intention, the research underscores the need to move beyond traditional awareness-raising approaches and instead focus on strategies that empower students and foster a sense of agency. The emphasis on beliefs and perceptions highlights the importance of addressing not only what students know about climate change but also how they feel about it and their perceived capacity to effect change.

Recommendations

Based on the findings, the following recommendations are put forth:

1. **Enhance Educational Strategies:** Educational interventions should move beyond simply imparting knowledge about climate change. They should be designed to cultivate students' willingness to engage by fostering intrinsic motivation, providing opportunities for action, and addressing barriers to engagement.
2. **Cultivate Beliefs and Perceptions:** Educational efforts should actively work to shape students' beliefs and perceptions about climate change and their role in addressing it. This includes promoting positive attitudes toward engagement and ensuring students perceive engagement opportunities as valuable and impactful.
3. **Promote Agency and Empowerment:** Educational practices should empower students by fostering a sense of agency and providing them with the skills and opportunities to take meaningful action at individual and collective levels.
4. **Future Research:** Future research should consider employing longitudinal designs and more intensive interventions to examine the long-term impact of educational strategies on youth climate change engagement. Further exploration of the contextual factors that facilitate or hinder engagement is warranted.

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