

**Bindura University
of Science Education**



FACULTY OF SCIENCE EDUCATION

**INVESTIGATING THE RELATIONSHIP BETWEEN CLIMATE CHANGE
EDUCATION AND ENVIRONMENTAL BEHAVIOURS**

BY

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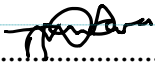
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DECLARATION

I, TAKUDZWA MUTAMBARA Student Registration Number B231342B do hereby declare that this dissertation is a result of my own investigation and research, except to the extent indicated in the acknowledgments, bibliography, references, and comments included in the body of the report, and that it has not been submitted in part or in full for any other degree to any other university.

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DEDICATION

This research is dedicated to my parents, my beloved wife and to my lovely children for their warm kindness and spiritual prayer to me during my studies.

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ABSTRACT

The study sought to investigate the relationship between climate change education and environmental behaviors in Glendale Cluster, Mazowe District. The objectives of the study were to investigate if climate change education is effective to encourage pro-environmental behaviors. The research was both quantitative and qualitative in nature where the study used questionnaire and interview schedule to gather information. The researchers extracted a sample of 50 O-Level Geography students from a study population of all O-Level learners from two secondary schools in Glendale Cluster. Data was presented and analysed using thematic analysis, descriptive statistics and correlation coefficients. The major findings were that students in Glendale Cluster displayed high level of knowledge of climate change, that the students displayed average to below average environmental behaviors, and that the students with high knowledge of climate change practice environmental behaviors more than students with low knowledge of climate change. The study shows that there is a weak positive correlation between students' knowledge of climate change and environmental practices. The researcher recommends that, schools should conduct practical work at school and in the community to encourage pro-environmental behaviors. Furthermore, the study recommends government support to increase staff establishments and reduce pupils-teacher ratios and the workload of Geography teachers in order to ensure effective teaching and learning in schools.

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CHAPTER ONE: INTRODUCTION TO THE STUDY

Introduction

This study focused on investigating the relationship between climate change education and environmental behaviors in Glendale, Mazowe District. This introductory chapter lays the foundation for the research by presenting the background, significance, and scope of the study. This chapter further discusses the importance of the study, delimitations and limitations of the study, definition of terms, and organization of the study.

1.1 Background of the Study

The global climate crisis has prompted urgent calls for transformative educational approaches that can effectively bridge the gap between knowledge acquisition and behavioral change (Sharpe, 2016). Zimbabwe has implemented substantial curriculum reforms to integrate climate change education across secondary school subjects (Mukwacha, 2020). However, preliminary studies indicate that these efforts yield inconsistent results, with high climate literacy rates not strongly correlating with sustainable practices (Sharpe, 2016). This discrepancy mirrors findings from other African contexts, where institutional, socioeconomic, and cultural factors mediate the knowledge-behavior relationship.

Despite the inclusion of climate change education as a mandatory component of Zimbabwe's secondary school curriculum since 2021, according to Moyo (2020) notes that. There is limited understanding of how this knowledge influences students' actual environmental behaviors. While the curriculum aims to equip learners with the knowledge necessary to address climate challenges, it remains unclear whether increased awareness leads to meaningful behavioral change. This issue is particularly critical as Zimbabwe faces escalating climate vulnerabilities and environmental degradation. Furthermore, existing literature reveals inconsistent findings regarding the link between students' knowledge of climate change and their real-life environmental actions (Ratinen, 2021).

The target population that is teachers and secondary school students represents a critical intervention point for climate action. Neuro-scientific research supports the view that adolescence is a formative stage for establishing lifelong behavioral patterns, while educational psychology highlights the effectiveness of school-based interventions during this

developmental window (Dow-Edwards et al., 2019). In the Zimbabwean context, secondary students occupy a unique position such that they are cognitively mature enough to grasp complex climate concepts, yet still adaptable in forming sustainable habits before transitioning into adulthood (Mukwambo, 2021). It is against this backdrop that the present study aims to explore the relationship between students' knowledge of climate change education and their environmental behaviors, thereby concluding the background foundation of this research.

Despite these educational initiatives, a significant gap persists in understanding whether enhanced knowledge of climate change translates into changes in environmental behaviors among secondary school students. Tanyanyiwa (2019) explains that students may demonstrate awareness of climate issues through classroom learning, the conversion of this knowledge into practical, sustainable actions in their daily lives remains uncertain. This disconnect between knowledge and action presents a critical area for investigation, particularly in Zimbabwe, where environmental challenges are acute and youth engagement in sustainability is essential.

1.2 Purpose of the study

The purpose of this study is to examine the relationship between students' knowledge of climate change and their environmental behaviors. Specifically, the research aims to determine whether students with higher levels of climate change knowledge are more likely to engage in pro-environmental practices such as waste reduction, energy conservation, and sustainable resource use than those with lower levels of knowledge. Additionally, the study will explore various factors that may influence this relationship between knowledge and behavior, including the school environment, community practices, and access to resources.

1.3 Problem Statement

The study investigates the relationship between climate change education and environmental behaviors in Glendale, Mazowe District. Despite the increasing urgency of climate change, there is a notable gap in understanding how educational initiatives influence individuals' environmental practices. Many residents may lack awareness of climate change impacts and sustainable practices, leading to ineffective engagement in environmental conservation. This ignorance can perpetuate harmful behaviors, such as poor waste management and deforestation, exacerbating local environmental degradation. Furthermore, existing educational programs may not effectively address the specific needs and cultural contexts of the community, limiting their impact. Therefore, this research aims to identify the extent to which climate change education correlates with positive environmental behaviors, ultimately seeking

to enhance educational strategies and promote sustainable practices within the community. This investigation is crucial for developing targeted interventions that can foster a more environmentally conscious populace in Glendale.

1.4 Objectives

- To assess the application of climate change knowledge in students' daily environmental.
- To examine the relationship between students' climate change knowledge and their environmental behaviors.
- To assess the level of climate change knowledge among secondary school students in Zimbabwe.

1.5 Research Questions

1.5.1 Main Research Question

What is the relationship between students' knowledge of climate change and environmental practices?

1.5.2 Sub-Research Question

1.5.2.1 What is the level of secondary students' knowledge of climate change across O-Level students?

1.5.2.2 What are the environmental behaviors displayed by O-Level students?

1.5.2.3 What is the relationship between climate change education and environmental behaviors among O-Level learners?

1.6 Hypothesis

H0: - There is a statistically significant positive relationship between secondary school students' knowledge of climate change and their environmental behaviors.

H1: - There is no statistically significant positive relationship between secondary school students' knowledge of climate change and their environmental behaviors.

1.7 Significance of the Study

The study sought to contribute to the existing body of knowledge on climate change and promote positive environmental behaviors. The findings were intended to inform educational stakeholders, including policymakers, geography teachers, parents, and community leaders,

and empower them to implement targeted strategies to address negative environmental behaviors which may result from lack of knowledge from climate change education. . Ultimately, the research endeavored to promote understanding the impact of climate change education on environmental behaviors can inform the development of effective educational programs aimed at promoting sustainable practices and mitigating climate change in Zimbabwe. This study can provide insights into how educational interventions can be designed to promote pro-environmental behaviors investigating the relationship between climate change education and environmental behaviors, can provide policymakers and educators with the information they need to design effective educational interventions that promote sustainable practices and reduce greenhouse gas emissions. This study can also contribute to our understanding of the factors that influence environmental behaviors and equip administrators to come up with strategies to mitigate negative environmental behaviors. Examining the relationship between climate change education and environmental behaviors, this study can provide insights into how these factors interact to shape environmental behaviors. The findings of this study can be used to inform the development of climate change education programs that are tailored to specific contexts and populations

The study's findings can also be used to let us know that if there is a relationship between high knowledge on climate change education and good environmental behaviors we must therefore conduct staff development so that teachers can teach effectively. Students will also have high knowledge on their pro-environmental behaviors. If the study finds a positive correlation between climate change education and environmental behaviors, it could support the integration of climate change education into national curricula

1.8 Delimitations

Delimitations set boundaries on the scope of the study. Geographically, the study was delimited to two selected secondary schools in Glendale, Mazowe District, Zimbabwe and does not encompass other districts or regions within the country. The selected schools are approximately 4km apart and one of them is a government school while the other one is a private school, due south.

Academically, the study covers O-Level students which are form 3 and 4 at secondary level to assess behavioral development throughout adolescence, specifically evaluating knowledge from the Form 3-4 "Environmental Science" syllabus on climate components. The study is going to focus on the O-Level students because there have obtain more knowledge on climate

change than the form ones and two. Also the study is not considering “A” level students as the teacher is not yet taking that level.

Further, the study focused on a sample size of 50 students drawn from these two schools to provide manageable and focused data within the available resources. The study employed a mixed research methodology, combining both quantitative and qualitative approaches to comprehensively analyze the relationship between student knowledge of climate change education and their environmental behaviors. Quantitative data were collected through structured questionnaires to capture measurable knowledge levels and behaviors, while qualitative data were gathered via interviews and focus group discussions to explore deeper insights, perceptions, and contextual factors influencing student behavior. Although the study’s scope was limited geographically and in sample size, the methodology was designed to provide both breadth and depth in understanding the research problem. The use of mixed methods also helped to overcome some limitations of relying solely on numerical data.

1.9 Geographic Scope

The research is limited to two selected schools in the Glendale cluster, Mazowe one government school and one rural school due to logistical considerations and the need to account for regional implementation differences. This choice may restrict the generalizability of findings to the broader context of Zimbabwe, where diverse educational and environmental conditions exist across different regions. Although this design allows for a focused examination of grade-level generalizability and developmental progression across O levels, it may not capture the full spectrum of climate education outcomes across the entire country

1.10 Limitations of the Study

This study investigates the relationship between climate change education and environmental behaviors in Glendale Cluster, Mazowe District. While it aims to provide valuable insights, several limitations.

1.10.1. Sample Size and Representation

A significant limitation in many studies, including this one, is the sample size. Small or non-representative samples can lead to biased results. According to Johnson et al. (2021), a limited sample may fail to capture the diversity of experiences and opinions within a community, which can skew the understanding of how climate change education influences behaviors. In

Glendale, where socio-economic and cultural factors play a crucial role, a more extensive and diverse sample would provide a more comprehensive picture of the community's engagement with climate issues.

1.10.2. External Influences on Environmental Behaviour

Environmental behaviors are influenced by a multitude of factors beyond education, including economic conditions, government policies, and social pressures. Recent research by Nguyen et al. (2024) underscores the importance of considering external influences when studying environmental behaviors. For instance, economic hardships may lead individuals to prioritize immediate needs over sustainable practices, regardless of their educational background. This multifaceted nature of behavior means that isolating the impact of climate change education is challenging.

1.10.3. Measurement of Environmental Behaviours

The methods used to measure environmental behaviors can also limit the study. Many studies rely on surveys or self-assessments, which can be influenced by the respondents' understanding of environmental issues. As highlighted by Kim and Zhao (2020), different individuals may interpret survey questions differently, leading to inconsistent data. Moreover, environmental behaviors can be complex and multidimensional, making it difficult to capture the full scope through limited survey instruments.

1.10.4. Lack of Control Groups

The absence of control groups in the study design may also limit the ability to draw causal inferences. According to Walker and Green (2023), experimental designs with control and treatment groups are crucial for establishing causal relationships. Without such a design, it becomes challenging to ascertain whether observed changes in environmental behaviors are directly attributable to climate change education or other confounding variables.

While the study aims to shed light on the critical relationship between climate change education and environmental behaviors in Glendale, Mazowe District, it is essential to recognize these limitations. Addressing these challenges through larger, more representative samples, careful measurement of behaviors, and consideration of contextual factors will enhance the robustness of future research. By acknowledging these limitations, the study can contribute to a more nuanced understanding of how educational initiatives can effectively promote sustainable practices within communities facing the impacts of climate change.

1.11 Assumptions

This study was carried out under the following assumptions:

It was assumed that climate change content was taught in the selected schools. Since both schools were chosen based on full implementation of the national climate change curriculum, it is expected that students had consistent exposure to key climate education topics appropriate for their grade levels.

It was assumed that students possess sufficient cognitive ability to understand and recall climate change concepts and related behaviors.

It was assumed that school-based environmental practices observed during the study period accurately reflect the normal routines and behavioral tendencies of the students. This assumption supports the use of direct observation and artifact analysis as valid methods for evaluating student environmental behavior.

It was assumed that the sampled schools are reasonably representative of other Zimbabwean secondary schools implementing the national climate curriculum. Though generalizability is limited, this assumption allows the findings to suggest trends that may be relevant to broader contexts, particularly other urban and rural schools facing similar climate-related challenges.

. This assumption underpins the study's focus on the school as the primary site of knowledge acquisition and behavior modelling, even as external factors are acknowledged and measured as moderating variables.

It is assumed that the selected behavioral indicators waste sorting, water conservation, energy use, tree planting, and sustainable transport are valid and observable proxies for environmentally responsible behavior among secondary students. These were chosen based on curricular alignment and measurability, and are presumed to represent meaningful environmental engagement.

1.12 Definition of Key Terms

Climate Change Education: Refers to the structured integration of climate change-related knowledge, skills, attitudes, and actions into the formal school curriculum, aimed at fostering climate literacy and promoting sustainable behaviors among students (Council, 2012).

Environmental Behaviors: Observable actions taken by individuals that contribute to the protection, conservation, or restoration of the natural environment (Akintunde, 2017). In this research, such behaviors include waste management, water conservation, energy efficiency, tree planting, and use of sustainable transport options.

Pro-Environmental Practices: refer to the voluntary behaviors that individuals adopt to minimize their ecological footprint and promote environmental sustainability. In the context of this study, these practices are specifically measured within schools and are influenced by both curriculum exposure and extracurricular reinforcement. This means that the education students receive about environmental issues, along with additional activities outside the classroom, plays a significant role in shaping their pro-environmental behaviors. These practices can include actions such as recycling, conserving energy and water, reducing waste, and participating in environmental initiatives. By integrating these behaviors into the school environment, the aim is to foster a culture of sustainability among students, encouraging them to adopt these practices both in school and in their daily lives (Mouro and Duarte, 2021).

1.13 Chapter Summary

This chapter provides an overview of the study, focusing on the impacts of climate change in Zimbabwe, such as increased droughts and erratic rainfall that threaten food security and sustainable development. In response, the country has integrated Climate Change Education (CCE) into its secondary school curriculum to enhance environmental awareness among youth. However, a gap exists in understanding whether this knowledge translates into pro-environmental behaviors. The research aims to examine the relationship between students' climate change knowledge and their environmental actions, such as waste reduction and energy conservation, while identifying factors that influence this connection. Given Zimbabwe's commitment to climate education as outlined in its National Climate Policy, the findings are expected to provide valuable insights for educators and policymakers, enhancing youth engagement in sustainability efforts. Overall, this chapter lays the groundwork for investigating the effectiveness of CCE in promoting responsible environmental behaviors among secondary school students.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

2.0 Introduction

This chapter provides a comprehensive synthesis of theoretical framework and empirical research on climate change education (CCE) and its relationship to pro-environmental behaviors among secondary school students. The review begins by examining one of the dominant theoretical perspectives that explain how environmental knowledge translates into action, The Theory of Planned Behavior (TPB). Following this theoretical foundation, the chapter analyses global and Zimbabwean empirical studies on CCE effectiveness, paying particular attention to research measuring behavioral outcomes rather than just knowledge acquisition. The review then investigates school based and contextual factors that influence the knowledge behavior relationship in Zimbabwean educational settings. Finally, the chapter identifies critical gaps in the existing literature that this study aims to address, particularly the lack of behavior focused CCE research in Zimbabwean secondary schools. This chapter establishes both the scholarly foundation and empirical justification for the current investigation into how CCE influences environmental behaviors among students in Glendale.

2.1 Theory of Planned Behavior (TPB)

The Theory of Planned Behavior (Ajzen, 1991) provides a cognitive framework for understanding how human behaviors result from deliberate decision-making processes. According to TPB, behavioral intentions the most immediate precursors to action are influenced by three primary factors which are personal attitudes toward the behavior (evaluations of its outcomes), subjective norms (perceived social pressures), and perceived behavioral control (beliefs about one's capability to perform the action). The theory operates on several fundamental assumptions that people rationally process available information before acting, that intentions capture the motivational factors influencing behavior, and that perceived control moderates the intention behavior relationship when individuals face situational constraints.

Empirical research has robustly supported TPB's application to environmental behaviors across diverse cultural contexts. (Kollmuss and Agyeman, 2002) landmark cross cultural study of 400 secondary students across five nations found that while climate change knowledge was necessary for pro-environmental action, it was insufficient without positive attitudes and supportive social norms. Their research revealed that students who believed their peers valued sustainability were 2.3 times more likely to engage in conservation behaviors, regardless of knowledge levels. Similarly, Bamberg and Möser (2007) meta-analysis of 46 environmental behavior studies demonstrated that TPB variables explained 27-39% of behavioral variance,

with perceived control emerging as particularly critical for resource dependent actions like recycling or energy conservation. These global findings have been replicated in African educational contexts, including Mubanga et al. (2022) Zambian study where students with access to waste bins (high perceived control) showed 40% higher recycling rates than peers without infrastructure support.

For Zimbabwean CCE programs such as environmental clubs, community workshops and government initiatives suggests several critical design considerations that address all three components of behavioral intention. First, curricula must move beyond knowledge transmission to explicitly shape students' attitudes about climate action's efficacy and personal relevance. This could involve using local case studies (e.g., impacts of droughts on Mashonaland Central's agriculture) to demonstrate tangible consequences. Second, programs should actively cultivate supportive social norms through peer led environmental clubs, public commitments, and visible endorsement from respected community figures. Finally, schools must collaborate with local authorities and NGOs to ensure students have actual opportunities to practice sustainable behaviors, addressing the perceived control barrier frequently observed in resource limited settings (Mukwambo, 2021). Without simultaneous attention to attitudes, norms, and control beliefs, even robust climate education may fail to generate meaningful behavior change among Zimbabwean secondary students.

2.2 Climate Change Education and Environmental Behaviours

The growing body of empirical research on climate change education reveals both promising trends and persistent challenges in translating knowledge into action across global contexts. Knowledge of climate change is a critical factor in shaping environmental behaviors and studies have shown that individuals with higher levels of climate change knowledge are more likely to engage in environmental behaviors. Climate change education can play a crucial role in enhancing knowledge of climate change, and thereby promoting environmental behaviors. This section identifies transferable best practices while highlighting context-specific considerations for the development of Climate Change Education (CCE) in Zimbabwe through the synthesis of empirical evidence.

While knowledge is a necessary precursor to behavior change, it is not sufficient on its own to drive behavior change. Research has shown that attitudes, social norms, and personal values also play a critical role in shaping environmental behaviors. Therefore, climate change

education should not only focus on enhancing knowledge, but also on developing positive attitudes and social norms.

The focus of the Zimbabwe school curriculum on climate change education, particularly under the Competence-Based Curriculum (CBC) introduced in 2017, is primarily on developing practical skills and fostering action-oriented learning. This is evidenced by what students do in the community and through project-based learning, rather than solely by grades attained through traditional examinations. While grades remain a component of the assessment system, the overarching goal is to equip learners with the ability to apply knowledge and contribute to real-world solutions related to climate change. Climate change education is not taught as a standalone subject but is integrated as a cross-cutting theme across various learning areas, including Geography. The curriculum aims to foster environmental literacy and empower learners to understand and respond to climate change challenges.

Zimbabwe specific research on CCE remains limited but reveals concerning systemic gaps. Mukwambo (2021) comprehensive survey of 30 secondary schools found only 41% included climate change in their science syllabi, with rates dropping to 12% in rural areas due to resource constraints. Where CCE does exist, (Sharpe, 2016) curriculum analysis suggests an overwhelming focus on rote memorization. 90% of assessed programs tested factual recall rather than behavioural competencies or applied problem solving. This aligns with broader regional trends; a UNESCO 2021 report review of 15 Southern African nations found only three had systematic CCE behaviour assessments in place. The consequences of these gaps are both practical and ethical – without robust behavioural data, Zimbabwean educators cannot know whether their CCE efforts are cultivating the informed, empowered citizens needed to address the climate crisis. This study aims to begin filling that critical evidence gap through its mixed methods assessment of both knowledge and behaviours among Mashonaland Central students.

2.3 Factors Influencing the Knowledge Behaviour Relationship

Understanding why climate knowledge often fails to produce corresponding behavioral changes requires examination of mediating factors at multiple ecological levels within Zimbabwean educational settings. Drawing on (Bronfenbrenner, 1979) ecological systems theory, this section analyses school based (microsystem) and external (microsystem/ecosystem) influences that shape students' environmental actions, identifying

actionable leverage points for improving CCE effectiveness. The analysis integrates empirical findings from Zimbabwe and comparable regional contexts to provide evidence-based recommendations for overcoming persistent barriers to pro-environmental behavior adoption.

2.3.1 School Based Factors

The immediate microsystem of classroom and school practices significantly impact CCE outcomes through several interconnected mechanisms. Teacher competence emerges as perhaps the most critical variable (Golovanov et al., 2021) Zimbabwean case studies demonstrated that pedagogically skilled teachers could double student engagement rates despite severe resource limitations through innovative approaches like using local environmental examples and student centered discussions. However, systemic barriers persist at national levels, in 2022 Zimbabwe Ministry of Primary and Secondary Education reported only 34% of science teachers received any climate specific training, with rural areas particularly underserved. Compounding this challenge, (Mukwambo, 2021) classroom observations revealed rural teachers spending 63% of allocated science periods on non-experimental instruction due to equipment shortages, drastically limiting hands on climate learning opportunities.

Curriculum design and implementation represent another pivotal school-based factor. (Stevenson et al., 2013) multi country study identified three hallmarks of effective CCE curricula local relevance (e.g., using Zimbabwean climate data and case studies), interdisciplinary integration (combining science, geography, and indigenous knowledge systems), and experiential components like field observations or projects. Unfortunately, Zimbabwe's current curriculum achieves only partial success on these dimensions while it mandates climate topics in Geography (Form 1-4) and Science (Form 3-4), implementation varies widely due to decentralized oversight. In 2022, Zimbabwe Ministry of Primary and Secondary Education evaluated that 78% of mandated climate competencies in urban areas, compared to just 31% in rural areas where teacher shortages and textbook deficits were most severe.

Extracurricular activities offer valuable opportunities to reinforce classroom CCE through social learning and behavioral practice. (Kamaruddin, 2010) Malaysian research found schools with active eco clubs saw three times greater student participation in sustainability actions compared to control schools. Zimbabwean examples exist but remain scarce and unevenly distributed only 22% of schools in the Environmental Management Agency's 2021 national

audit had functioning environmental clubs, concentrated in urban and peri urban areas. Successful models like Harare's "Green Schools" program demonstrate what's possible, with participating schools reducing water waste by 40% through student led monitoring systems. Scaling such initiatives to rural areas like Mashonaland Central would require targeted investments in teacher training and basic materials, presenting both a challenge and opportunity for CCE improvement.

2.3.2 External Influences

Beyond school walls, the microsystem of school community interactions and ecosystem of broader societal factors equally shape CCE outcomes through multiple pathways. Community practices and local knowledge systems create powerful normative influences that can either reinforce or undermine school based CCE. (Esakkimuthu and Banupriya, 2023) Tamil Nadu study showed students living near community managed conservation zones demonstrated 50% higher environmental values and behaviors than urban peers, highlighting the impact of consistent ecological modeling. Zimbabwean parallels exist anecdotally in communities bordering protected areas like Mana Pools and Gonarezhou, though no formal studies have quantified this effect. Conversely, (Frischen et al., 2020) interviews with 30 Mashonaland Central teachers revealed that 68% struggled to overcome community skepticism about climate science, particularly from elders who perceived it as conflicting with traditional weather knowledge.

Family socioeconomic status creates another critical external influence through both material and cultural pathways. (CHRISPIM, 2021) resource accessibility framework explains how poverty constrains environmental actions even when knowledge and motivation exist Zimbabwean households spending 60% of income on basic food needs (ZIMSTATS, 2022) understandably prioritize immediate survival over sustainability practices. This creates a vicious cycle, (Frischen et al., 2020) parent interviews revealed 78% of rural respondents viewed climate education as irrelevant to their children's future livelihoods, favoring vocational agriculture skills instead. These findings echo (Njau, 2024) Kenyan study where school composting programs failed because students couldn't replicate them at home without basic materials.

Policy environments at national and regional levels represent another key ecosystem factor shaping CCE implementation. While Zimbabwe's Education Act of 2006 broadly mandates environmental education, no specific policies govern CCE standards, teacher preparation, or

outcome assessments. This contrasts with neighboring South Africa's Curriculum and Assessment Policy Statements (CAPS) that allocate 15% of Natural Sciences instructional time to climate topics with standardized behavioral metrics (Msezane, 2022). Such policy gaps perpetuate inconsistent CCE quality nationwide and hinder accountability (Mutasa, 2022) analysis found only 11% of Zimbabwean schools met basic climate education benchmarks compared to 63% in South Africa's Eastern Cape province.

2.4 Challenges in climate education framework

Zimbabwe's CCE system faces numerous challenges that hinder effective implementation and integration into the national educational framework. These challenges stem from historical, structural, and resource-related issues that affect both the curriculum and the capacity of educational institutions to respond to climate change effectively.

Resource disparities between urban and rural schools create stark inequalities in CCE access and quality. (Mukwambo, 2021) national survey of 150 secondary schools revealed that 89% of urban institutions had at least basic climate teaching aids (e.g., weather instruments, updated textbooks), compared to just 12% of rural schools. This material inequality extends to human resources – rural schools face 43% vacancy rates in science teacher positions (Mukwambo, 2021), leaving many students without qualified CCE instructors.

The shortage of educators who are well-versed in climate change science and pedagogy is another critical challenge. Many teachers do not have the requisite training to teach climate change topics effectively, which results in a gap in knowledge transfer to students. This lack of expertise is compounded by the absence of a structured professional development framework that focuses on climate education. Although Zimbabwe has developed various policies aimed at addressing climate change, such as the National Climate Change Learning Strategy (NCCLS), there is often a disconnection between policy formulation and implementation. The government has struggled with "implementation paralysis," where well-articulated policies fail to translate into actionable programs within educational institutions. This gap undermines the potential impact of climate change education initiatives. The socioeconomic context in Zimbabwe also poses challenges to climate change education. High levels of poverty and unemployment limit access to education and resources necessary for effective learning. Rural communities, in particular, face significant barriers due to their reliance on climate-sensitive livelihoods.

Cultural perceptions and knowledge systems present equally formidable barriers to effective CCE implementation. (Frischen et al., 2020) ethnographic work in Mashonaland Central documented widespread skepticism about climate science's relevance to daily struggles among both students and community members. Among 150 interviewed parents, 62% prioritized teaching practical agricultural skills over "theoretical" climate concepts, with many expressing distrusts of Western scientific models that seemed disconnected from local ecological knowledge. This aligns with broader African findings; Mbugua's (2019) Kenya study showed communities resisting CCE programs that didn't explicitly address immediate food and water security concerns. Zimbabwe's rich heritage of indigenous environmental knowledge offers potential bridges (Chanza, 2014) research documented sophisticated Shona concepts like "zviera" (resource prohibitions) and "mitupo" (totemic conservation practices) that could contextualize modern climate science. However, such integration remains rare in formal curricula due to both lack of teacher training and lingering colonial era biases against indigenous knowledge systems in formal education.

Assessment limitations compound these challenges by creating perverse incentives that prioritize rote learning over behavioral change. (Sharpe, 2016) curriculum analysis found that 90% of Zimbabwe's CCE assessments tested factual recall through multiple choice and short answer questions, with less than 5% evaluating applied skills or behavioral competencies. This emphasis on memorization has cascading effects; teachers interviewed in (Mutasa, 2022) study admitted "teaching to the test" rather than facilitating action-oriented learning, while students reported disengaging from content they perceived as irrelevant to real world challenges. The lack of validated behavior measurement tools specifically designed for Zimbabwean contexts further hampers progress. Most available instruments were developed in Western contexts and fail to capture culturally relevant behaviors like communal resource management. This assessment gap represents both a challenge and opportunity for developing contextually appropriate evaluation frameworks that recognize diverse expressions of environmental stewardship.

Emerging solutions show promise despite these systemic challenges. Pilot programs like UNICEF's 2022 "Green Schools" initiative in Matabeleland combined teacher training with community engagement, resulting in 300% increases in student led conservation projects over two years. Moyo (2020) notes that, the Ministry of Environment's 2021 report integrates climate topics into practical agriculture syllabi improved rural student engagement by linking CCE to livelihood relevant skills like drought resistant cropping techniques. However, these

remain isolated examples rather than systemic reforms, highlighting the need for comprehensive policy action that addresses CCE's structural barriers while building on localized successes. The current study contributes to this effort by documenting both challenges and promising practices in Mashonaland Central schools, providing evidence to inform more equitable and effective CCE policies nationwide.

2.5 Research Gap

Despite growing global scholarship on climate change education, critical gaps such as pro-environmental behaviors are not examined therefore they are not valued by students and parents. This section identifies three key limitations in existing literature and explains how the current research design systematically overcomes these shortcomings through its methodological approach, theoretical integration, and contextual focus.

Students demonstrate a good knowledge of climate change rather than behavioral outcomes, creating an evidence vacuum about actual program effectiveness. (Sharpe, 2016) systematic review of 28 local studies found only two that included any behavior assessment, both relying solely on unverified student self-reports. This knowledge behavior disconnect leaves educators and policymakers without crucial data we know students can recite climate facts but not whether they adopt sustainable practices in their daily lives.

Second, existing CCE research in Zimbabwe overwhelmingly focuses on urban and peri urban settings, neglecting the rural majority. (Mukwambo, 2021) annotated bibliography shows 78% of local CCE studies were conducted in Harare or Bulawayo province schools, despite 68% of Zimbabwean secondary students attending rural institutions. The research deliberately incorporates an urban rural comparative design, pairing an urban school with a rural school in Mashonaland Central Province. This approach enables identification of both universal principles and context specific adaptations needed for effective CCE across diverse Zimbabwean settings.

Beyond these empirical gaps, theoretical integration remains underdeveloped in Zimbabwean CCE research. No local studies have simultaneously applied TPB framework despite its complementary strengths for understanding knowledge behavior relationships. Our approach innovatively combines these perspectives to analyze how cognitive, moral and social factors interact in Zimbabwean school contexts. The consequences of these research gaps extend beyond academia to practical policy and programming challenges. Without robust evidence on what works, Zimbabwe's Ministry of Education cannot make informed decisions about CCE

curriculum design, teacher training priorities, or resource allocation. This study aims to provide actionable insights for multiple stakeholders, curriculum developers seeking evidence-based content approaches, teacher trainers addressing pedagogical gaps, and school administrators implementing cost effective CCE improvements. By systematically addressing these research gaps such as understanding students' knowledge, their environmental behaviors and the relationship between climate change education and environmental behaviors; the study contributes both to global scholarship on climate education and to localized efforts to build Zimbabwean students' capacity.

2.6 Chapter Summary

This chapter has examined theoretical framework of TPB and empirical research on climate change education (CCE) and its impact on youth and students' environmental behaviors, with a focus on Zimbabwean secondary schools. The review identifies key challenges including urban rural resource gaps, cultural barriers, and insufficient behavioral assessments that hinder effective CCE implementation for young learners. These findings highlight research gaps in understanding how CCE influences youth environmental actions. The conclusions pave the way for Chapter 3's methodology, which will operationalize these insights through targeted research design choices to evaluate CCE's effectiveness among students in Glendale, Mazowe District. By building on this comprehensive review, the study positions itself to produce practical knowledge that can strengthen CCE's role in equipping Zimbabwean youth and students with the skills and motivation to address climate challenges.

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 Introduction

This chapter presents the methodological framework employed to investigate the relationship between Climate Change Education (CCE) and environmental behaviors among secondary school students in Zimbabwe. The study adopts a mixed methods approach to comprehensively address four key objectives thus assessing students' climate change knowledge levels, student environmental behaviors, examining the correlation between knowledge and pro-environmental behaviors, and identifying contextual factors influencing this relationship. The chapter systematically outlines the research design, population and sampling procedures, data collection instruments, and analysis techniques. Ethical considerations and study limitations are also discussed. Reliability and validity of qualitative research e.g., methodological rigor are discussed.

3.1 Research Design (paradigm, approach and strategy)

3.1.1. Research Philosophy

This study is grounded in a pragmatic research philosophy, which emphasizes practical solutions to real world problems (Ishtiaq, 2019). Pragmatism is particularly appropriate for this research as it transcends the traditional dichotomy between positivism and interpretivism, allowing for methodological flexibility in addressing the complex relationship between CCE and environmental behaviors. The philosophy aligns with the study's theoretical frameworks, including the Theory of Planned Behavior (Ajzen, 1991) which emphasize both measurable behaviors and contextual influences. Pragmatism supports the integration of quantitative methods (to measure knowledge behavior correlations) with qualitative approaches (to explore socio cultural barriers), enabling a more holistic understanding of the research problem. This philosophical stance acknowledges that while objective knowledge about climate change is important, the meaning students derive from this knowledge and their capacity to act upon it are equally crucial considerations in Zimbabwe's educational context.

3.1.2. Research Approach

A mixed methods approach was employed to comprehensively investigate the research problem, combining quantitative surveys with qualitative interviews (Ishtiaq, 2019). This approach leverages the strengths of both methodologies: the surveys provide measurable data on knowledge levels and behavior frequencies across a representative sample, while the

interviews offer in depth understanding of the contextual factors influencing these behaviors. This dual approach is particularly valuable in educational research, where numerical data about learning outcomes often requires contextual interpretation to inform practical improvements. The integration of methods occurs at the analysis stage, where statistical findings are compared and contrasted with emergent themes from interviews to develop a comprehensive understanding of CCE's impact on student behaviors in Zimbabwean secondary schools.

3.1.3 Research strategy

The study employs a convergent methods design, which allows for simultaneous collection and analysis of both quantitative and qualitative data (Creswell and Clark, 2018). This design is particularly suitable for examining complex educational phenomena where numerical data needs contextual interpretation. The quantitative component involves a cross sectional survey measuring students' climate change knowledge and self-reported environmental behaviors, while the qualitative component utilizes semi structured interviews to explore the lived experiences of students and teachers regarding CCE implementation. This design choice addresses the study's need to both quantify the knowledge behavior relationship and understand the contextual factors influencing this dynamic in Zimbabwean secondary schools.

3.2 Population and sampling

3.2.1 Population

The target population for this study comprises two secondary schools offering Geography to O-Level learners in the Glendale cluster. This region was selected due to its acute vulnerability to climate change impacts, as established in Chapter Two, and its representation of both government school and private school. The population includes all students who have completed at least one year of CCE under Zimbabwe's revised curriculum and teachers who have delivered CCE content for a minimum of one academic year. The population characteristics ensure that findings will be relevant to policymakers seeking to improve CCE implementation across different school contexts in Zimbabwe.

3.2.2 Sampling

Sampling is the process of selecting specific individuals, groups, or subsets from a larger population to gather data for a research study (Otzen and Manterola, 2017). A sample represents a portion of the population chosen for measurement and analysis, and it must accurately reflect the characteristics of that population to ensure the findings can be

generalized. In this study, which examines the awareness of climate change among students, careful sampling is essential to obtain insights that are applicable to the broader student population.

Two schools were selected as research sites: Rujeko secondary school (government school) and Taalnet Secondary School (private school). These institutions were chosen based on their full implementation of the national CCE curriculum and their contrasting geographical locations, which represent the diversity of Zimbabwe's educational landscape.

In the quantitative phase, 50 learners were selected, with equal representation from two schools. Additionally, twenty student interviewees were chosen to represent varying levels of environmental engagement, identified through preliminary surveys. This judgmental sampling balances the need for generalizable quantitative data with the requirement for rich qualitative insights from information-rich cases. By ensuring participation from diverse academic levels and considering government and private school differences in educational experiences and environmental exposures, the approach effectively addresses potential biases and enhances the validity of the study.

3.3 Data Collection Techniques / Research Instruments

Research instruments are essential tools for collecting information and addressing the questions being investigated (Buntins et al., 2021). In this study, which explores the awareness of climate change among students, both structured questionnaires and semi-structured interviews were employed to gather comprehensive and relevant data. This combination was chosen to ensure a robust collection of information that effectively meets the research objectives. Utilizing questionnaires allowed for efficient collection on learners' knowledge of data from a larger sample, while interviews facilitated deeper qualitative insights from key respondents. This mixed-methods approach enhances the validity and richness of the findings, providing a thorough understanding of students' knowledge and behaviors related to climate change education.

3.3.1 Questionnaire

A questionnaire is defined by Rowley (2014) as a logically structured instrument that incorporates various data collection techniques, prompting participants to respond to a set of predetermined questions. In this study, the questionnaire was designed with three main

sections: demographic information, a 20-item climate change knowledge test adapted from validated instruments, and a 15-item environmental behavior scale using a five-point Likert format. The knowledge test assessed understanding of climate science, local impacts, and mitigation strategies, while the behavior scale measured the frequency of pro-environmental actions, such as waste management and energy conservation.

The choice of a questionnaire was strategic, allowing for time-efficient data collection, straightforward comparison of responses, and flexible response times for participants. The five-point Likert scale, anchored from "strongly disagree" (1) to "strongly agree" (5), enabled precise assessment of respondents' views or attitudes on specific topics. This design provided ample information to support the study's findings.

Respondents were instructed to select the appropriate answer by checking a designated box. A copy of the standardized questionnaire used for this research is available in Appendix A. The first section focused on gathering information about demographic characteristics, ensuring quick completion with a clearly outlined response format. The second section addressed the study's objectives and included the five-point Likert scale, facilitating easy comprehension of questions and enabling respondents to provide accurate data efficiently.

3.3.2 Face-To-Face Interviews

Face-to-face interviews, involve direct discussions where the interviewer asks questions to gather information from the interviewee (Pagliarin et al., 2023), According to (Pagliarin et al., 2023), these interviews are a direct method of inquiry, utilizing structured questions to collect data in person. In this research, in-person interviews were conducted to gather essential qualitative insights. This method allowed for the verification of data and the acquisition of richer insights, as the researcher could interpret additional cues from verbal expressions, tone, and body language. A total of twenty interviews were conducted with students, providing diverse perspectives on the effectiveness of climate change education, behavioral influences, relationship and implementation challenges.

3.4 Data collection plan

The data collected by the researcher was presented on statistical tables such as: frequency tables, tally tables as well as pie charts. The data presentation tables used were advantageous in that they made the collected data comparable and amenable for analysis. More so, the data presentation tables used compacted the data and made it easier for the researcher draw inferences on it. Thereafter, the presented data was analyzed and interpreted in relation to the

research questions of the study. This means that the researcher correlated the gathered data with findings from earlier researchers to ascertain similarities and differences.

3.5 Data Reliability and Validity

Reliability in data refers to information that is consistent, accurate, and fulfils its intended purpose (Pagliarin et al., 2023). To enhance reliability, the study implemented several measures, including expert reviews and pilot testing. Content validity was established through evaluations by three Climate Change Education (CCE) specialists and a pilot test of the questionnaire with 25 students, resulting in a Cronbach's alpha of 0.82 for the behavior scale. Validity measures whether an instrument accurately reflects what it aims to measure (Buntins et al., 2021). The study ensured content validity by consulting experts to assess the relevance of questionnaire items and refining interview protocols through pilot interviews with three students not included in the main study. Ethical validity was upheld through approval from Bindura University informed consent processes, and measures to protect participant confidentiality. These rigorous procedures ensure that the findings are both trustworthy and applicable to the context of CCE in Zimbabwe.

3.6 Data Analysis Techniques

This study employed thematic data analysis approach. According to Braun and Clarke (2012), thematic data analysis is a qualitative research method used to analyse and interpret patterns, themes, and meanings within textual or qualitative data. The first step in thematic analysis involved organising the collected data, which included interviews and questionnaires.

The researcher begun the analysis process by engaging in initial coding through systematically assign descriptive labels or codes to segments of data that represented meaningful ideas. This process involved closely reading the data, identifying key concepts, and labeling them with descriptive codes.

After the initial coding, the researcher identified overarching themes or patterns that emerged from the coded data. Themes represent recurring topics, ideas, or issues that are salient across different data sources and participants (Braun and Clarke, 2006). Themes related to factors influencing relationship between climate change education and environmental behaviors. In addition, the researcher iteratively refined and reviewed the identified themes capturing the essence of the data and reflected on the research objectives. This process involved comparing themes across different data sources, examining variations within themes, and seeking input from multiple researchers to enhance the credibility and validity of the analysis.

3.7 Ethical Considerations

Ethical considerations serve as guiding principles based on societal norms, attitudes, and expectations ((Dahal et al., 2024). The study adhered to stringent ethical protocols throughout the research process. Formal approval was obtained from Bindura University's Research Ethics Committee and participating school authorities. Informed consent was secured from all participants, including parental consent for minors, with forms translated into Shona where necessary. Participants were fully briefed on the study's purpose, their voluntary participation, and confidentiality measures, including the anonymisation of all data. Data were stored securely, with audio files deleted after transcription. The research design minimized disruption to school activities by scheduling data collection during free periods, and special care was taken to mitigate potential power dynamics in teacher-student interviews, ensuring that participation would not affect academic standing. These measures uphold the principles of respect, beneficence, and justice in educational research.

3.8 Chapter Summary

This chapter has detailed the comprehensive methodological framework guiding the investigation of CCE's relationship with environmental behaviors in Zimbabwean secondary schools. The convergent methods design, grounded in pragmatic philosophy, enabled both quantitative measurement of knowledge behavior correlations and qualitative exploration of contextual influences. Stratified and purposive sampling ensured representative and information rich data from two contrasting school contexts. Rigorous data collection procedures using validated instruments and ethical protocols supported the reliability and validity of findings. The analytical approach integrated statistical and thematic analysis to provide nuanced understanding of how CCE translates (or fails to translate) into pro-environmental actions. While acknowledging limitations, this robust methodology positions the study to generate meaningful insights for improving CCE implementation and impact. The next chapter presents and discusses the findings emerging from this methodological approach.

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

4.0 Introduction

The chapter will focus on data presentation, analysis and discussion of findings from research questions. Tables will be used for data visually. This study investigates the relationship between climate change and environmental behaviours within the Glendale Cluster in Mazowe District. Focusing on a sample of 50 O level students from two schools, a private school and a government school.

4.1 Demography of Participants

Table 4.1 Distribution of participants by school type (n=50)

	NUMBER OF LEARNERS	GOVERNMENT SCHOOL	PRIVATE	PERCENTAGE
BOYS	20	12	8	40
GIRLS	30	14	16	60
TOTAL	50	24	26	100

The above table shows a study sample comprises of 50 O level geography learners from Glendale Cluster in Mazowe District. The participants are divided by gender as follows: 20 boys distributed as follows 12 from government school and 8 from private school, 30 girls distributed as follows as 14 from government and 16 from private school. The inclusion of both a private school and government school further enriches the analysis by providing insights into how different educational contexts may influence student engagement with climate issues.

There is a growing emphasis on girls' education in many in many regions, including Zimbabwe, which has led to initiatives aimed at increasing female enrolment in school. In some communities, there may be cultural or societal expectations that prioritize girls' education, encouraging families to invest more in their daughters schooling. This can result in more girls pursuing O level geography compared to boys. Geography as a subject map appeal more to girls, particularly as it often includes discussions on social; issues and environmental topics, aligning with their interests. Schools may offer more extracurricular programs or support networks aimed at girls, encouraging them to engage and remain in school. In some households, boys may be encouraged to take on work or responsibilities outside of school, leading to lower enrolment numbers compared to girls. There may be better access to educational resources and

support for girls in these schools, making it easier for them to participate fully in their education. These factors collectively contribute to the observed demographic imbalance between girls and boys in the O level geography cohort.

4.2 The level of student knowledge of climate change education

Table 4.2 Summary of the table showing student knowledge (n=50)

School type	Number of students	Average knowledge level (1-20)	Percentage 100	Comments
Private	26	17	85	High knowledge
Government school	24	14	70	Moderate knowledge

The table highlight a summary of student knowledge between 2 schools. The level of knowledge was measured with a test out of 20. The test was converted into percentage and those who will score below 70 it shows that they have low knowledge and those who score from 70 to 75 they have average knowledge and those score above 80 it shows that they have high knowledge. The students of private score scored an average of 85 percent ant this shows that they have high knowledge of climate change. The students from government score scored an average of 70 percent which shows that they have average knowledge of climate change. This shows that the learners from government school have low knowledge as compared to those in private school in Glendale Cluster.

Table 4.3 Knowledge of Climate Change

	Frequency	Percentage
5	1	2.0
6	1	2.0
9	1	2.0
10	1	2.0
11	1	2.0
12	1	2.0

13	5	10.0
14	7	14.0
15	8	16.0
16	5	10.0
17	9	18.0
18	5	10.0
19	5	10.0
Total	50	100

The table above indicate that few of the students have little knowledge of climate change whereas most of them have better understanding of the changes brought in by climatic conditions. Students who have better understanding and knowledge of climate change are able to express their opinions on how it can be mitigated to avoid negative environmental impacts.

4.3 Practices of environmental behaviours

Table 4.4 Table of practices (environmental behaviours)

School type	Number of students	Average practices (1-5)	Comments
Private	26	3,1	Moderate practices
Government	24	2.8	Low practices

The table shows the results of environmental practices from a test of a set of 15 questions given to them. The mean was created from the average out of 5. The private school students scored a mean of 3.1 which is moderate and the students from government school scored a mean of 2.8. The students from private school shows that they have more environmental practices than learners from government school. However even though the students from private school are performing more environmental practices than those of government school, there is no students from both school that have high environmental practices.

Table 4.5 showing frequency of behaviours

	Frequency	Percentage
Rarely	5	10.0
Sometimes	23	46.0
Often	20	40.0
Always	2	4.0
Total	50	100

The table above shows the level of how learners practices environmental behaviours. The table showing that only two students always practices environmental behaviours and five students rarely practices environmental behaviours, most of the students sometimes they practices environmental behaviours which is below average and this is a clear picture that less than half of the students out the 50, practices environmental behaviours. Combining rarely and sometimes, it shows that there is 56 percent of students who are below average in terms of practicing environmental behaviours. 44 percent of the learners are practicing environmental behaviours.

4.4 Relationship between Knowledge of climate change education and environmental behaviours.

Table 4.6 Relationship between Knowledge of climate change education and environmental behaviours.

School type	Number of learners	Average knowledge (100%)	Average practices (1-5)	Comment
Private school	26	85	3.1	moderate positive relationship
Government	24	70	2.8	Weak positive relationship

The table above shows the relationship between students' knowledge and environmental behaviours on two schools government and private school. The students at private school shows high level of knowledge of climate change. The average score of students' knowledge from private school is 85 percent, this is high knowledge and their environmental behaviours have a mean score of 3.1. The average score of their environmental behaviour is moderate. This shows that even though students from private school have high knowledge of climate change, they are not apply all that knowledge into action so that high knowledge can lead to high environmental practices. On the other hand the students from government school have average knowledge of 70 percent which shows that the have average knowledge of climate change. The environmental practices of students from government school have an average of 2.8. This shows that there is a weak relationship between students' knowledge and environmental behaviours as the knowledge of students of government school is average but their environmental behaviours are below average.

Table 4.7 Correlations

		Knowledge of Climate Change	Pro-environmental behaviours
Knowledge of Climate Change	Pearson Correlation	1	.115
	Sig. (2-tailed)		.428
	N	50	50
Pro-environmental behaviours	Pearson Correlation	.115	1
	Sig. (2-tailed)	.428	
	N	50	50

Correlations coefficients were performed to determine relationship between knowledge of climate change and environmental behaviours displayed. Table 4.7 above shows a weak positive correlation coefficient of +0.1

The study argues that knowledge often leads to better understanding of environmental issues, motivating students to adopt sustainable practices. Students with better educational resources may develop both knowledge and practices more effectively. Positive behaviours may be reinforced by peers who are environmentally conscious. However students may have high knowledge but lack opportunities or resources to practice environmentally friendly behaviours. Knowledge does not always translate into action, personal motivation and values play a significant role. Different cultural values may affect how knowledge is applied in practice. This structured approach you enables you to present and analyse the relationship between student knowledge and practices effectively.

4.4 Discussion of findings

4.4.1 The level of secondary students' knowledge of climate change across O level students in Glendale Cluster

Understanding the level of secondary students' knowledge of climate change is essential for developing effective educational strategies. This section discusses the findings from the research question "What is the level of secondary students' knowledge of climate change across O level students in Glendale Cluster". Insights were gathered from focus groups labelled A to E, reflecting the learners' comprehension of climate change concepts and their implications.

Across all groups, students exhibited a range of knowledge level of climate change representing both schools, government and private school. One student remarked "climate change is caused by human activities like deforestation and pollution, and it leads to severe weather changes". This sentiment indicates a solid grasp of the causes and consequences of climate change, which aligns with the findings from previous studies emphasizing the importance of comprehensive climate education (Brown and Green, 2021).

When asked about specific climate change concepts, groups exhibited varying degrees of familiarity. Students displayed confidence in discussing terms like "carbon footprint" and "greenhouse gases" one learner stated "*Reducing our carbon foot print can help to slow down climate change*". This shows an understanding on actionable steps that can be taken to reduce

and fostering responsible environmental behaviours (Lee, 2019). However in one of the groups a student stated that” *I’ve never heard of a carbon footprint before. What does it mean*” This highlights the necessity for more comprehensive climate change education through intervention to ensure all students are equipped with essential climate vocabulary and concepts (Miller, 2018)

The analysis of the data indicates a significant variance in the level of knowledge about climate change among O level students in Glendale Cluster. Some groups such as A and C shows higher knowledge levels, often participated in discussions about climate solutions while the other groups showed gaps in understanding. This disparity underscores the need for tailored educational approaches that cater to varying levels of prior knowledge (Taylor, 2022)

4.4.2 “How do O level students practice environmental behaviours in the Glendale Cluster“

Understanding how O level students practice environmental behaviours is crucial for assessing the effectiveness of climate change education and fostering sustainable practices among students. This section discusses the findings from the research question “How do all level students practice environmental behaviours in Glendale Cluster”. In sights were gathered from focus groups labelled A to E, reflecting the learners engagement in various environmental practices.

Students across the groups exhibited varying levels of engagement in environmental initiatives. Group A actively participated in community clean up campaigns. One student noted “*we organized a clean up campaign at our school and invited the community to join us, it was rewarding to see everyone come together*” This demonstrates a proactive approach to environmental stewardship, which aligns with the findings that highlight positive impact of collective action in promoting sustainability (Johnson and Smith, 2021). In contrast group B reported less participation in such initiatives. A participant said “*we don’t do much like that, we focus more on our studies*” This indicates a potential disconnect between academic responsibilities and environmental engagement. The emphasis on academic performance may detract from opportunities for students to engage in meaningful environmental practices (Lee, 2020)

4.4.3 What is the relationship between climate change education and environmental behaviours among O level students in the Glendale Cluster”

The relationship between student knowledge of climate change and environmental behaviours is critical for understanding how education affects behaviour. This section discusses the finding from the research question “What Is the relationship between students’ knowledge of climate change and environmental behaviours in Glendale Cluster” Using qualitative data collected from the focus groups (labelled A to E), the insights reflect the learners understanding and actions regarding climate change.

Participants from all groups demonstrated varying levels of knowledge about climate change. Group ‘A’ expressed comprehensive understanding of climate change concepts. One group stated that “*Climate change affects our weather patterns and can leads to drought, which we have seen in our area*”. This demonstrates awareness of local impacts, aligning with findings from other studies that emphasize the importance contextual knowledge (Smith, 2020). In contrast, group B revealed gaps in knowledge. The group remarked “*We hear about climate change, but we don’t know how it affects us directly*”. This indicates a need for more targeted education that connects climate change to everyday life, as those lacking knowledge are less likely to engage in environmentally friendly practices (Jone, 2019).

The study identifies a correlation between knowledge of climate change and environmental practices. Group C and D, which exhibited a higher understanding of climate change, reported pro-active behaviours such as recycling and participating in tree planting initiatives. Group C noted “*We started recycling of plastics at our school and it feels great to contribute towards saving the environment*” This align with research indicating that increased knowledge leads to positive environmental action (Green and Smith,2021). Conversely group E showcased minimum engagement in environmental practices. The group stated that “*we don’t have time to think about these things, we are focused on exam*”. This suggests that academic pressure can hinder environmental participation, even those who have some awareness of climate issues.

The data reveals a positive relationship between knowledge of climate change and environmental behaviours. Schools that incorporate climate change education into their curricula appear to empower students to adopt greener behaviours. For instance, learners from group A and C actively discussed initiatives they had undertaken such as organizing clean up campaigns and advocating for sustainable practices at school and in their communities. These

findings support the theory that educational intervention can significantly enhance environmental behaviours (Miller, 2018).

4.5 Chapter summary

This chapter explored the relationship between climate change education and environmental behaviours among O level students in Glendale Cluster. Through the use of questionnaires from both schools, private and government school, key findings emerged regarding their understanding and engagement with climate change topics. Students with high level of knowledge of climate change are more involved in pro environmental behaviours such as recycling, water conservation and participation in community initiatives. In contrast, students with limited exposure climate change education like those in government school showed minimal engagement in environmental behaviours. However even those learner with high knowledge level of climate change does not mean they have high environmental practices but everyone who was involved in environmental practices have high knowledge of climate change. This highlights the need for targeted educational strategies that empower all students. Local relevance in the curriculum was identified as crucial for motivating students to adopt sustainable practices. The findings underscore the importance of intergrating climate change to foster environmental behaviours. Overall, the chapter emphasize the effectiveness of climate change education in influencing environmental behaviours. From this chapter the findings showed that students from both school have high knowledge of climate change even though those from private school have more knowledge than those from government school. Also the findings shows that the environmental behaviours of students are average even though those from government school are involved less in environmental practices that students from private school. In addition there are also findings on the relationship between knowledge of climate change and pro environmental behaviours. Those with high knowledge are involved more in environmental practices than those with less knowledge, this shows that they is a positive relationship between knowledge of climate change and pro environmental behaviours.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter presents a synthesis of the study's findings on the relationship between climate change education and environmental behaviors among O-level learners in Glendale Cluster. It summarizes key insights highlighting how varying levels of climate change education influence students' engagement in sustainable practices. The analysis reveals significant correlations between educational exposure and proactive environmental behaviors. In light of these findings, the chapter concludes by emphasizing the critical role of integrated climate change education in shaping responsible environmental stewardship among youth. Recommendations will be provided to enhance educational strategies aimed at fostering greater awareness and engagement in environmental issues. These recommendations will focus on curriculum development, community involvement, and targeted initiatives to empower all students, ensuring they are equipped to address the pressing challenges of climate change effectively.

5.1 Summary of the study

Chapter one provides an overview of the study, focusing on the impacts of climate change in Zimbabwe, such as increased droughts and erratic rainfall that threaten food security and sustainable development. In response, the country has integrated Climate Change Education (CCE) into its secondary school curriculum to enhance environmental awareness among youth. However, a gap exists in understanding whether this knowledge translates into pro-environmental behaviors. The research aims to examine the relationship between students' climate change knowledge and their environmental actions, such as waste reduction and energy conservation, while identifying factors that influence this connection. Given Zimbabwe's commitment to climate education as outlined in its National Climate Policy, the findings are expected to provide valuable insights for educators and policymakers, enhancing youth engagement in sustainability efforts. Overall, this chapter lays the groundwork for investigating the effectiveness of CCE in promoting responsible environmental behaviors among secondary school students.

Chapter 2 examined theoretical framework of TPB and empirical research on climate change education (CCE) and its impact on youth and students' environmental behaviors, with a focus on Zimbabwean secondary schools. The review identifies key challenges including urban rural resource gaps, cultural barriers, and insufficient behavioral assessments that hinder effective CCE implementation for young learners. These findings highlight research gaps in

understanding how CCE influences youth environmental actions. The conclusions pave the way for Chapter 3's methodology, which will operationalize these insights through targeted research design choices to evaluate CCE's effectiveness among students in Glendale Cluster. By building on this comprehensive review, the study positions itself to produce practical knowledge that can strengthen CCE's role in equipping Zimbabwean youth and students with the skills and motivation to address climate challenges.

Chapter 3 detailed the comprehensive methodological framework guiding the investigation of CCE's relationship with environmental behaviors in Zimbabwean secondary schools. The methods design, grounded in pragmatic philosophy, enabled both quantitative measurement of knowledge behavior correlations and qualitative exploration of contextual influences. Stratified and purposive sampling ensured representative and information rich data from two contrasting school contexts. Rigorous data collection procedures using validated instruments and ethical protocols supported the reliability and validity of findings. The analytical approach integrated statistical and thematic analysis to provide nuanced understanding of how CCE translates (or fails to translate) into pro-environmental actions. While acknowledging limitations, this robust methodology positions the study to generate meaningful insights for improving CCE implementation and impact. The next chapter presents and discusses the findings emerging from this methodological approach.

Chapter 4 explored the relationship between climate change education and environmental behaviors among O-level learners in the Glendale Cluster. Through the use of questionnaires to both schools, key findings emerged regarding their understanding and engagement with climate change topics. Groups with more comprehensive education demonstrated proactive environmental behaviors, such as recycling, water conservation, and participation in community initiatives. In contrast, groups with limited exposure to climate change concepts showed minimal engagement and understanding. This highlights the need for targeted educational strategies that empower all students, particularly boys, to engage with climate issues. Local relevance in the curriculum was identified as crucial for motivating students to adopt sustainable practices. The findings underscore the importance of integrating climate change education into school curricula to foster environmental stewardship among young learners. Overall, the chapter emphasizes that effective climate education can significantly influence students' behaviors, encouraging them to become proactive advocates for environmental sustainability in their communities

5.2 Conclusion of the Study

This study aimed to explore the relationship between climate change education and environmental behaviors among O-level learners in the Glendale Cluster. Through focus group discussions and qualitative analyses, several key findings emerged, directly addressing the research questions posed at the outset of the investigation.

5.2.1 Students' knowledge of climate change education

The first research question focused on the level of secondary students' knowledge of climate change across O-level learners. The findings revealed significant variations in knowledge levels, with some students demonstrating a robust understanding of climate-related issues, while others struggled with basic concepts. This suggests that curricula need to be more comprehensive and contextually relevant to foster a deeper understanding of climate change among all students. However, the test given to learners shows that many students have high knowledge of climate change from both school even though the learners from private school demonstrated high knowledge than those in government school.

5.2.2 Students' environmental behaviours

The second research question explored how O-level students practice environmental behaviors. The findings indicated that engagement in environmental initiatives varied among the groups. On average learners demonstrated moderate pro environmental behaviors. Students from the private school displayed more environmental behaviours than those from the government school.

5.2.3 Relationship between students' knowledge of climate change education and environmental behaviours

The third research question examined the relationship between climate change education and environmental behaviors among O-level learners. The findings indicated a weak positive correlation; students who received comprehensive education on climate change were more likely to engage in environmentally friendly practices. This highlights the critical role that curriculum design and teaching methodologies play in shaping students' environmental attitudes and behaviors. Students with higher knowledge of climate change were more likely to engage in pro environmental behaviors.

5.3 Implications

The implications of this study are significant for educators, policymakers, and community leaders aiming to enhance climate change education and foster sustainable practices among

youth. The findings emphasize the urgent need for educational strategies that not only impart knowledge but also motivate students to take actionable steps towards environmental stewardship.

There is a need to develop and implement curricula that are comprehensive and contextually relevant. This includes integrating local environmental issues into the curriculum, which can help students connect their learning to real-world challenges. By making climate education more relatable, students may be more inclined to engage in environmental behaviors. The study highlights the effectiveness of active learning strategies, such as project-based learning, in promoting environmental awareness. Schools should incorporate hands-on activities that allow students to engage directly with environmental issues, fostering a sense of responsibility and agency.

This study demonstrates a significant relationship between climate change education and environmental behaviors among O-level learners in the Glendale Cluster. The findings reveal that comprehensive education can empower students to adopt sustainable practices, while gaps in knowledge hinder engagement. By prioritizing effective climate education, educators can foster a generation of environmentally conscious individuals who are equipped to tackle the pressing challenges posed by climate change. The recommendations outlined in this study aim to enhance educational strategies and promote active engagement among all students, ensuring a more sustainable future for their communities and the planet.

5.4 Recommendations of the Study

Based on the findings and insights derived from the research questions regarding climate change education and environmental behaviors among O-level learners in the Glendale Cluster, several targeted recommendations can be proposed. These recommendations aim to enhance climate change education, foster environmental stewardship, and ultimately contribute to sustainable practices among students.

Schools should ensure that climate change education is an integral part of the curriculum across subjects, particularly in science and geography. This curriculum should not only cover the scientific aspects of climate change but also include discussions on its social, economic, and environmental impacts. Lessons should focus on local environmental issues, allowing students to connect global concepts to their immediate surroundings. For instance, incorporating local case studies of droughts or deforestation can help students understand the relevance of climate change to their lives.

Implementing project-based learning can significantly enhance student engagement. Schools should design projects that require students to investigate local environmental challenges and propose solutions. For example, students could work on reforestation projects or develop community awareness campaigns about waste management. Such projects can empower students to take ownership of their learning and foster a sense of responsibility toward the environment.

Educational programs should emphasize experiential learning through hands-on activities. Schools can organize field trips, workshops, and community service projects that allow students to engage directly with environmental issues. Activities such as tree planting, clean-up drives, and recycling programs can provide practical experience and reinforce classroom learning, making the concepts of climate change tangible and relevant.

Leveraging technology can enhance the learning experience. Schools should incorporate multimedia resources, such as documentaries, interactive simulations, and online platforms, to provide diverse learning modalities. Virtual reality experiences related to climate change impacts can also immerse students in the subject matter, fostering empathy and understanding.

Schools should actively promote participation in environmental initiatives, such as eco-clubs or sustainability committees, where students can lead projects and campaigns. These platforms can provide students with opportunities to collaborate, share ideas, and implement sustainable practices within the school and the community. Establishing reward systems for students who actively engage in environmental behaviors can motivate participation. For instance, schools could recognize students for their contributions to recycling programs, tree planting, or community service. Awards and certifications can create a positive reinforcement loop, encouraging more students to get involved. Implementing mentorship programs where older students guide younger peers in environmental initiatives can foster a sense of community and shared responsibility. This can also help build leadership skills among all students, regardless of gender. Schools should collaborate with local organizations, NGOs, and environmental groups to enhance climate education. These partnerships can provide resources, expertise and opportunities for students to engage in community-based environmental projects. Community involvement can reinforce the lessons learned in class and help students see the real-world impact of their actions.

Schools can lead community awareness campaigns focused on climate change and sustainability. Involving students in organizing workshops, seminars and public forums can

empower them to spread knowledge and engage the broader community. These initiatives can foster a culture of sustainability within the community, encouraging families to adopt environmentally friendly practices.

Teachers play a crucial role in delivering climate change education. Schools should invest in professional development programs that equip teachers with the knowledge and skills needed to effectively teach climate change concepts. Workshops, seminars, and training sessions focused on innovative teaching methods and the latest climate science can enhance teachers' confidence and effectiveness in the classroom. Schools should ensure that teachers have access to comprehensive teaching resources, including lesson plans, multimedia materials, and guidelines for implementing climate education. Developing a repository of resources that teachers can easily access will facilitate the integration of climate change education into their lessons.

Schools should develop assessment metrics to evaluate the effectiveness of climate change education programs. Regular evaluations can help identify areas for improvement and measure students' knowledge and engagement over time. Surveys, interviews, and focus groups can be used to gather feedback from students, teachers, and the community, providing valuable insights into the program's impact.

Based on monitoring and evaluation results, schools should be prepared to adapt and revise their educational strategies. Continuous improvement will ensure that climate change education remains relevant and effective in fostering environmental behaviors. Educators and school leaders should advocate for policies that support climate change education at the local and national levels. Engaging with policymakers can help secure funding and resources for climate education initiatives. Collaborating with environmental organizations to influence policy decisions can create a more supportive environment for implementing climate change education in schools.

Schools should raise awareness among parents, local leaders, and community members about the importance of climate change education. Engaging stakeholders in discussions about climate issues can foster a collective commitment to sustainability. Workshops and informational sessions can help parents understand the significance of climate education and encourage them to support their children's involvement in environmental initiatives.

The recommendations derived from this study emphasize the need for comprehensive, engaging, and contextually relevant climate change education for O-level learners in the Glendale Cluster. By enhancing curriculum development, promoting active learning strategies, addressing gender dynamics, and fostering community involvement, schools can empower students to take meaningful action in addressing climate change. These recommendations aim to create a holistic educational environment that not only informs students about climate issues but also inspires them to become proactive environmental stewards, ensuring a sustainable future for their communities and the planet.

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APPENDIX 1; Dear Participant,

I am conducting a research study as part of my Bachelor of Science in Education degree at Bindura University of Science Education (BUSE). The research is titled:

“Investigating the Relationship Between Climate Change Education and Environmental Behaviors”

This study seeks to explore how climate change education (CCE) influences the environmental behaviors of secondary school students. You have been identified as a valuable participant for this research, either as a student or teacher directly involved in or affected by climate change education within the current curriculum.

Your participation may involve completing a short questionnaire and/or participating in a brief interview. This will take approximately 15 to 30 minutes. All information collected will be

kept strictly confidential and used solely for academic purposes. No personal identifiers will be included in any reports or publications.

Please be assured that participation is entirely voluntary, and you may withdraw from the study at any time without penalty. Your input is vital in helping to improve climate education and environmental awareness strategies in Zimbabwean schools.

If you have any questions or need additional information, please feel free to contact me.

Thank you for your time and for contributing to this important research.

Yours faithfully,

Takudzwa Mutambara

Student

Bindura University of Science Education

Bachelor of Science in Education (Hons) – Researcher

Ethics Approval Ref:

APPENDIX 2: INTRODUCTORY LETTER



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APPENDIX 3: CONSENT FORM

Consent Form for Participation in Research

Research Title:	Investigating the Relationship Between Climate Change Education and Environmental Behaviors.
Researcher:	Takudzwa Mutambara
Institution:	Bindura University of Science Education

Please read the following statements carefully and tick each box to indicate your agreement:

- ☐ I have read and understood the information about this research study.
- ☐ I understand that my participation is voluntary and I may withdraw at any time without penalty.
- ☐ I understand that all information I provide will be kept confidential and used for academic purposes only.
- ☐ I understand that my identity will not be revealed in any publication resulting from this study.
- ☐ I agree to participate in this research study.
- ☐ I consent to the interview being audio recorded (if applicable).

Participant's Name: _____

Participant's Signature: _____ Date: _____

Researcher's Signature: _____ Date: _____

APPENDIX 4: QUESTIONNAIRE

Climate Change and Environmental Behavior Questionnaire

Section A: Demographic Information

Please tick or fill in the appropriate response.

- Age: _____
- Gender: ☐ Male ☐ Female ☐ Other
- Form: ☐ Form 1 ☐ Form 2 ☐ Form 3 ☐ Form 4 ☐ Form 5 ☐ Form 6
- School Type: ☐ Private ☐ Government
- Have you participated in any school environmental club or project? ☐ Yes ☐ No

Section B: Climate Change Knowledge

Choose the best answer (tick one per question).

- Climate change is caused mainly by:
☐ Natural cycles ☐ Human activities ☐ Ocean currents ☐ I don't know
- The main greenhouse gas responsible for global warming is:
☐ Oxygen ☐ Methane ☐ Carbon dioxide ☐ Nitrogen
- Deforestation contributes to climate change.
☐ True ☐ False ☐ Not sure
- Which of the following is a consequence of climate change in Zimbabwe?
☐ More snow ☐ Frequent droughts ☐ Earthquakes ☐ None
- Climate change mainly affects:
☐ The ozone layer ☐ Agricultural productivity and water supply ☐
Airplane travel ☐ Entertainment industries
- Which sector contributes most to climate change in Zimbabwe?
☐ Manufacturing ☐ Agriculture and deforestation ☐ Healthcare ☐ Mining only
- Which of these practices helps reduce climate change?
☐ Littering ☐ Burning fossil fuels ☐ Planting trees ☐ Wasting water
- The rise in average global temperatures is called:
☐ Greenhouse Effect ☐ Global Cooling ☐ Global Warming ☐ Weather shift

- Climate change education is part of which school subjects in Zimbabwe?
☐ Mathematics ☐ Geography and Environmental Science ☐
 Shona ☐ Business Studies
- What is the purpose of the National Climate Policy (Zimbabwe, 2021)?
☐ Promoting technology only ☐ Building climate literacy and adaptation
☐ Encouraging political debates ☐ Replacing textbooks
- Which activity increases your carbon footprint the most?
☐ Riding a bicycle ☐ Reusing water bottles ☐ Leaving lights on ☐
 Walking to school
- Climate change leads to sea-level rise due to:
☐ Increased rainfall ☐ Melting ice caps ☐ Frequent wind ☐ Ocean drying
- Using energy-efficient appliances at school and home helps to:
☐ Increase bills ☐ Reduce emissions ☐ Waste electricity ☐ Cause power cuts
- What is the role of trees in climate regulation?
☐ They cool the atmosphere and absorb carbon dioxide ☐ They heat the earth ☐
 They block sunlight ☐ They have no role
- Which of this best defines climate change?
☐ Daily weather changes ☐ Morning and evening weather differences ☐
 Long-term changes in temperature and weather patterns ☐ Lunar changes
- Recycling helps the environment by:
☐ Saving money only ☐ Conserving resources and reducing waste ☐
 Causing pollution ☐ Creating landfills
- Zimbabwe's climate change education aims to:
☐ Make students memorize definitions ☐ Raise awareness and promote action ☐
 Increase class attendance ☐ End Geography classes

- Students can reduce climate change impacts by:
 - ☐ Burning waste ☐ Reporting environmental violations ☐
 - Avoiding school ☐ None of the above
- A school environmental club helps students:
 - ☐ Skip class ☐ Participate in pro-environmental activities
 - Buy school uniforms ☐ Change subjects
- Which of the following is an example of climate change adaptation?
 - ☐ Ignoring rainfall patterns ☐ Using drought-resistant crops ☐
 - Flooding fields ☐ Wasting water

Section C: Environmental Behavior Scale

Please rate how often you do the following behaviors.

(1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Always)

- I switch off lights when not in use.

[1] ☐ [2] ☐ [3] ☐ [4] ☐ [5] ☐
- I avoid wasting water at home and school.

[1] ☐ [2] ☐ [3] ☐ [4] ☐ [5] ☐
- I recycle paper, bottles, or plastics.

[1] ☐ [2] ☐ [3] ☐ [4] ☐ [5] ☐
- I walk or use a bicycle instead of motor transport.

[1] ☐ [2] ☐ [3] ☐ [4] ☐ [5] ☐
- I reuse items (e.g., water bottles or bags).

[1] ☐ [2] ☐ [3] ☐ [4] ☐ [5] ☐

- I participate in school environmental clubs or projects.

[1] ☐ [2] ☐ [3] ☐ [4] ☐ [5] ☐

- I talk to others about protecting the environment.

[1] ☐ [2] ☐ [3] ☐ [4] ☐ [5] ☐

- I help in planting trees at school or home.

[1] ☐ [2] ☐ [3] ☐ [4] ☐ [5] ☐

- I throw waste into proper bins.

[1] ☐ [2] ☐ [3] ☐ [4] ☐ [5] ☐

- I turn off electrical devices when not in use.

[1] ☐ [2] ☐ [3] ☐ [4] ☐ [5] ☐

- I help monitor energy or water use at school.

[1] ☐ [2] ☐ [3] ☐ [4] ☐ [5] ☐

- I participate in clean-up campaigns.

[1] ☐ [2] ☐ [3] ☐ [4] ☐ [5] ☐

- I encourage others to act sustainably.

[1] ☐ [2] ☐ [3] ☐ [4] ☐ [5] ☐

- I separate waste into recyclables and non-recyclables.

[1] ☐ [2] ☐ [3] ☐ [4] ☐ [5] ☐

- I make personal efforts to reduce my environmental impact.

[1] ☐ [2] ☐ [3] ☐ [4] ☐ [5] ☐

APPENDIX 5: INTERVIEW SCHEDULE

Structured Interview Schedule

This interview guide is intended for use with secondary school students and teachers in the study: **"Investigating the Relationship Between Climate Change Education and Environmental Behaviors"**.

The interviews will be conducted face-to-face and are semi-structured, allowing for probing and clarification. Interviews should last between 15–25 minutes. Responses will be audio recorded with participant consent.

Section A: Interview Questions for Students

- What do you understand by the term 'climate change'?
- Can you describe how your school teaches you about climate change?
- What specific topics or lessons have you learned about climate change in school?
- Are there any school activities or clubs that help you apply what you've learned about the environment? Please explain.
- How do you practice what you learn about climate change in your daily life (at home or at school)?
- What motivates you to participate in environmental activities?
- What challenges, if any, prevent you from practicing sustainable behaviors?
- Do you talk to your family or community about climate change? If yes, how do they respond?
- How do your teachers or peers influence your behavior regarding the environment?
- In your opinion, how can climate change education be improved in your school?

THE END THANK YOU

